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Downy Woodpecker

Photographed
by
Edward McColgan



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ANNOUNCEMENT

Beginning with this number, "MARYLAND, a Journal of Natural History" will be known as the "MARYLAND NATURALIST". This change has been deemed advisable since the full name was considered too long, particularly in bibliographical citations, and when listed without the subtitle, the name failed to identify the character of the publication. No change in editorial policy is contemplated.

The journal will continue to be issued quarterly but will be designated by the names of the seasons rather than the months published.



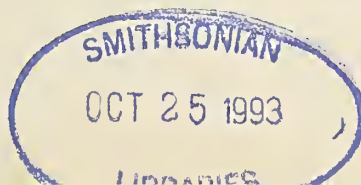
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White-footed Mouse

Photographed by Haven Kolb

WINTER EXPEDITION IN MARYLAND

by

Romeo Mansueti

It is winter — one of those bright, cold and scintillating days after a snowfall, when the sun rides high and only the rustling of tree limbs betrays the breeze. You feel that the world is at peace; yet, on such quiet and still days, all is not dead and lifeless. For suddenly the air is filled with sputters and scolding from above you in a tree. An impudent-looking "chickaree" or red squirrel, basking in the afternoon's sunrays, stares down at you saucily with sparkling black eyes. He seems to be working himself into a frenzy of excitement over your intrusion. His rusty-red color fairly gleams in the sunlight, and the small ear tufts twitch in nervous agitation. You move toward him, however, and still chattering with annoyance he quickly disappears into a hole in the tree.

A few moments before, the landscape around you seemed empty and devoid of life, as if all living things had been swallowed up by the earth until spring. But now, at least, you are sure that winter has not stifled all animal life. Perhaps your impressions of winter may change after communing more intimately with her. Fortunately, she is not so disagreeable as your imagination may lead you to believe, especially after you have turned naturalist for a time.

By observing the various environments around you, some of the most enchanting patterns of beauty are found, all of them fashioned by Mother Nature's deft hands. Exquisite examples of symmetry and design found in snowflakes, frost and ice crystals defy imitation by artists in our civilization. One need only to scrutinize closely this world of cold, blasting winds, ice and snow to find fascinating and strange sights that would usually escape detection from casual observers. With a little persistence and interest, plus stamina and resistance and a wanderlust (that will probably result in soaked feet and a sniffing cold), the uninviting countryside in winter will slowly unfold its marvels and secrets, like a morning glory seen opening its petals for the first time on a bright dewy morn. Winter can be a veritable wonderland.

A trip to the outskirts of northeastern Baltimore is an expedition that will be filled with as many surprises as Admiral Byrd encountered on his recent trip to the Antarctic regions. On such a wintry day, outside of the suburbs the smooth landscape of snow will appear virginal, almost primeval. At first the cold atmosphere and the difficulty in locomotion will exasperate you. Soon this unpleasant feeling is lost and you make an astounding observation — the earth is awakening! Nothing has stirred, nor has the almost

FRONTISPIECE

This handsome, sleek and large-eyed mouse is one of the most active winter animals, and is especially abundant around Lake Roland. The adults have a brown pelage, but the young are gray, and both are cottony-white on the feet and undersides of the body.

(COVER)

During the winter months the downy is commonly heard and seen in the Lake Roland region. Its drumming is a familiar sound as it searches for some choice grub in the bark of trees. Here it is feeding on suet that some kind bird-lover has placed on trees especially for it.

PICKEREL FROGS IN BARE HILLS CAVE

Photographed by
Joseph Schreiber, Jr.

In mid-winter this spotted frog is active deep in the recesses of the abandoned chrome mineshaft located near Lake Roland. The specimens photographed were surprised by a photo-flash far back in one of the caves just before they jumped into the icy waters. This remarkable portrait is the result.



RED SALAMANDER

Photographed by Edward McColgan

In cold springs and near the entrance to the Bare Hills mine shaft, the delicate, glass-like red salamander easily withstands the icy water despite its cold blood. The eggs, which are laid in winter, are much sought after by herpetologists.

perfect tranquillity been broken by sound, yet you are suddenly aware that the land is breathing. It is actually alive! With this realization your observation on a winter trek will be rich and full of unusual experiences and colorful sights.

As you approach Lake Roland, not far from the nearest streetcar line, the quiet is suddenly shattered by the splashing of water and the flapping of wings. Beyond the trees the air is torn by beating wings, as if a score of birds were frightened. Two duck-like birds appear over the black bushes, vanishing almost in a moment, but they unexpectedly veer to the left toward the opposite side of the lake, and their identity is unmistakable. They are hooded mergansers, a rare sight even for ornithologists. Showy with their larger fan-like crest of white bordered with black, these distinctive birds have a plumage that is mostly black and white. Although the striking coat makes the hooded merganser one of our more conspicuous fish-eating ducks, it may be more easily identified by its flight, in which the head, neck and body are held horizontal, a mode of flight that is unlike that of other ducks.

Along Jones Falls a formation of American mergansers can be seen for a few moments as they follow the stream away from the lake. They fly in the same rakish, long-bodied manner as the hooded merganser, following the Jones Falls with carefully exact movement. American mergansers can be startled any day because they are one of the commonest of our winter ducks, and the large white males with green-black heads unmistakably set this species apart from all other ducks that may be encountered.

As you approach the edge of the lake, the water appears calm except for the dying ripples caused by the mergansers. They had been swimming along the edges of the lake. On the far side more ducks are startled from their feeding along the reedy flats by the watcher's movements. Some mallards and pintails are recognizable from afar, but the rest soon fly out of sight. You could imagine the ducks arriving at night along these shores. The whistling of their wings would be picked up as they pass overhead, and then, skimming along the surface, they would settle in a quiet passageway along the reeds, swim close to the windward shore beneath the sedges, and, with their heads under their wings, fall fast asleep. Ducks will not sleep in freshwater retreats in below-freezing weather, but will usually migrate to the salt-holes along the Chesapeake Bay, so that they will not freeze in the ice.

Along the bank of the lake curious depressions are noted going to and from the water's edge. Upon closer inspection you see that they are animal tracks, some tiny and others large. Why are these creatures wandering about during the winter? Many mammals hibernate, but some prefer to face the rigors of the cold season. Ducks are reinforced with a garment of down beneath their feathers to cope with the bitter cold; in like manner, mammals cultivate a luxurious growth of fur, and depend on this and a thick subcutaneous layer of fat to keep them warm.

In some cases rodents, such as flying squirrels and meadow mice, find it to their advantage to live gregariously, snuggling close to each other to share the warmth of their bodies. The creatures that make the tracks are largely invisible. Winter has tempered their senses to an amazing acuteness, and life means for them clear-cut survival of the fittest.

The day-wanderers sense human approach by scent, long before you even come upon the tracks. Opossums, white-footed mice, cottontail rabbits, foxes and muskrats have left their marks here and there. If you had been more stealthy you might have had a glimpse of a muskrat industriously searching for roots and stems of the succulent plants to supplement the supply already stored in the fall season. Somehow the waterways are attractive to all active animals in winter; the herbivorous animals are attracted by the tender plants and roots that are still edible and the carnivores are attracted to the plant-eating animals.

Mounting the slope of a hill warily without making the noisy "crunch-crunch" of cracking snow-crust, you may glimpse the thick rustic coat of a red fox cautiously making his rounds for careless "Molly cottontails". In many cases, foxes only succeed in catching mice, as stomach examinations made by specialists of the Fish and Wildlife Service prove.

A grove of trees in winter is always attractive. In order to reach it a fence must be climbed. While you are attempting this, a loud commotion is heard nearby. From beneath some briar, half-buried under the snow, a rabbit leaps, bounding in a zig-zag fashion. The flashing, fluffy rump, conspicuously showing as the rabbit disappears over the hill, is one of the most familiar sights in our Maryland outdoors. Although the bobbing appears comical, the cottontail has no difficulty running over the snow, since his feet are thickened, almost snowshoe-like in design. He is extremely vulnerable to attack from above, and a tragedy involving the rabbit and a barred owl, the silent marauder of the winter night, is often written in the snow by impressions of wings, blood and marks of struggle.

A soft, sweet whistle is heard nearby — *whirl-ee!* Trying to approach it as noiselessly as possible, you hear again *whirl-ee, whirl-ee, whirl-ee-gig*, carried sweetly and almost plaintively to your ears. The melodious call is so liquid, mellow and low that the identity of the creature making it mystifies you completely. Amid the bare cheerless atmosphere, this call is as welcome as a bright candle in a dark cavern. In a second, your eyes are riveted upon it — a she-quail with head held high, listening anxiously. Again she whistles, louder this time, and from the woods comes a faint answering call, *bob-white!* Soon more calls sound around you: from the patch of briar; from the woods, and from somewhere in the snow in the meadows. The answer seems to produce a spell. Soon a bird flies toward you, but in the excitement of the moment your movement causes the charm to be broken. The bob-whites disappear over the hill.

However carelessly you trudge through the snow, you are sure to meet the so-called "hero of the woods", the chickadee. Although appearing to be just a ball of feathers this fascinating little bird is one of winter's most animated creatures. Even city-folk can be introduced to him. Your eyes discover a flock of these energetic and courageous birds hunting for food on the leeward sides of boles and branches left bare and black after the recent snowstorm. A stream is nearby, smothered beneath coverlets of ice and pillows of drift. If you are awed by the stillness, the air may be broken by that happy winter song, *chick-a-dee-dee-dee*. Some of the most callous hearts may be softened by the beauty of nature in this revelation. The ever-present slate-colored junco, more familiarly called the snowbird,

enlivens every step into a new territory, and it can be seen flitting from tree to tree feeding upon grain and weed-seeds. When seen on the snow, its slaty-blue back makes it appear like a dark-colored bird, but below it is dull white.

After this burst of life, the observer wonders about the fauna that remains unseen. What happens to the frogs, lizards and snakes? Nature has provided them with a cold-blooded system that necessitates taking heed of the winter. In the fall, frogs and their allies either migrate to the hillsides and bury themselves beneath humus or rotten logs, or they swim to the bottom of a pond, burrowing into mud and water-saturated leaves. There they remain in hibernation until spring. During this time the body processes require hardly any oxygen - just enough is used to nourish the body cells. Lizards and snakes disappear at the first indication of cold in autumn, and they too bury themselves under piles of leaves, thick humus, rotten logs or in rocky crevices on hillsides or under houses and barns (particularly where mice are plentiful). They do not venture from these retreats until the first warm rays of the sun activate them in spring.

It is almost inconceivable that the vast hordes of insects, that creep crawl and fly about, those that "sing" or chirp with their wings and legs, or those that bite or sting, are all completely asleep. Almost all insects hibernate in either the larval, pupal, nymphal or adult stages under piles of debris of every type, underground, and under bark of trees, until spring when they transform or emerge in the next successive stage in their life history. Some are imprisoned in galls, cocoons and chrysalises that can easily be found on bare bushes and trees. Stop and cut open a gall. Perhaps you will reveal a small white grub at the center. This larva probably belongs to a little two-winged fly, which will emerge just as the buds are bursting in the spring. Notice the curious growths on the bark of one tree. Pry them open with your knife; probably you will uncover a scale-insect, one of nature's most curious creations.

If you pause a moment and split a decaying log open, your increasing curiosity will be amply rewarded. The variety of life existing in one log is astonishing. A diversity of insect forms are bared - lo and behold, even a sleeping black widow spider, the scourge of the arthropod world. She is curled in a little ball snugly within a small cavity burrowed by a huge beetle larva. She probably killed and ate her tiny striped husband before falling off to sleep in autumn. Something is moving ever so slightly under some brown wood pulp, and if you dig the animal out, the sparkling eyes of a small red-backed salamander will regard you intently from the dust-covered body. Although rather sturdy, this salamander is not able to compete against the winter as some of its cousins do. These may be found active in most springs.

A bundle of grass, twigs and hair catches your eye, and when you poke the nest with a stick three white-footed mice scamper out upon the snow and immediately seek shelter. Thrown out of their home, these doe-eyed, handsome-looking mice will easily prepare another. Regardless of how cold it becomes, the white-footed mouse is always active, and forever getting into the traps of mammalogists, who seek some of our rarer mice and shrews which also remain awake on winter nights. It is ironical to think that evolutionists say that these very meekly-dressed mice may someday inherit the earth because of their tough and hardy constitution in any environment.

A steady crunching is heard within a drift, and despite the noise that you make, the digging continues. Approaching the sound cautiously you search for its source, and when you have the location you act quickly and try to cut a circle around the spot where you believe the animal is burrowing. Ah, you have trapped him in the center of the snow heap! Carefully separating the snow particles you are rewarded with nothing. However you can rest assured that it was probably a mole, perhaps even the weird-looking star-nosed mole.

Somehow you have wandered toward Bare Hills, and you are confronted by an even more barren-looking landscape. Aren't there caves in this area? Any red-blooded amateur naturalist should submit to the lure of the new and mysterious experiences offered by a cave. A cold and clear stream trickles from the opening, which is really an abandoned mine shaft. A fish-like creature rapidly swims with lateral undulations from one rock to another. When you lift the rock, a golden-backed, two-lined salamander wriggles away spasmodically. The eyes are jewel-like, the borders flaked with gold. If you lift and shift many rocks, the prize of any trip is revealed -- a brilliant red salamander, with the reflection of shimmering water over its gorgeous color. Emblazoned on top of the body are black dots irregularly placed. Although it is an active animal, you can handle it safely, since all salamanders are harmless. The red salamander like all salamanders, is an amphibian, and therefore cold-blooded, so you must marvel at its ability to withstand the cold, almost freezing water. Since the specimen is a female, it is possible that she may have laid her eggs in the water, attached to the lower surface of a rock. These gelatinous eggs are much sought by herpetologists to provide the necessary link in the life history of this salamander. When released, the red salamander wriggles away jerkily, unmindful of her experience. She possesses a poor memory, capable of recalling but a few minutes of the past.

Penetrating deeply into the cave you soon reach the gloomy section; then finally the dark, rear portion. If you look back, the white entrance will appear small and faraway. You had to pick your way to the interior by stepping gingerly from one stone to another, but finally after too many missteps and spills, you resolutely waded knee-deep in the icy water to the back of the mine shaft. Soon your eyes are accustomed to the partial darkness, but aid from a flashlight is invaluable. Your splashing frightens a delicate, speckled long-tailed salamander, but the powerful beam from your flashlight arrests its movement, and its orange and black colors are resplendent against the dull black of the cave's walls. You lunge for the frail creature, and the peculiar slowness that mortal humans possess is revealed against the noticeable agility of this animal in its own environment.

You flash your light on the walls. Here and there, hibernating mosquitoes and moths seem riveted to the sides in their statuesque poses. At first you see nothing unusual, but after peering intently into the crevices you soon discover some furry creatures crowded together, some almost packed like sardines. Bats! Yes, they are hibernating bats. It is not particularly cold in this section of the cave and no ice is present as on the outside. Some bats are hanging head downward from the ceiling and a few of the inert animals are covered with silvery droplets of water.

You pry several out, and they move sluggishly after being handled by warm hands. After awhile they become active, and several make a vain attempt to bite with their needle-like teeth. The head and feet have an almost human

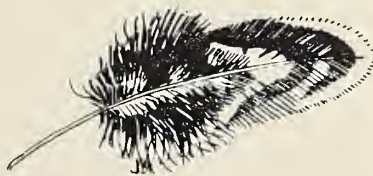
appearance. Nature has endowed this bizarre animal with such an acute sense of hearing that the belief arose that the bat was possessed with a sort of a "sixth sense", by which it was warned of the nearness of solid objects while the individual was in flight. In reality, it has been recently found that bats when flying are constantly emitting sounds beyond the range of human hearing. These cries, which are given off with extreme rapidity, are reflected back to the bats by solid objects, thus apprising them very accurately of the obstacles. These small, sluggish creatures before you seem a far cry from the graceful diving, flitting and incredibly swift bats of the summer, in full possession of their radar-like apparatus. Mindful of their beneficial insectivorous diet and their innocuous habits, you place the bats back in the crevices to continue their slumber. On the way out of the cave, your light beams catch reflections from the eyes of pickerel frogs sitting nonchalantly on the jagged rocks on the sides of the cave. When disturbed they are quite active, and not at all sluggish like the warm-blooded bats. They hide in the bottom of the water in the cave, but others are observed in the crevices near the water's edge.

Upon reaching the entrance you are greeted by a lone downy woodpecker drumming steadily into the bark of an old tree nearby. The woodpecker presents a singular picture of infinite patience as it drills for some choice grub. Finally it is rewarded with a worm and quickly gulps it down and the drumming stops for a few minutes.

Nearby crows "*caw, caw*" harshly, and promptly others join the chorus until the loud coarse shouts seem to announce a "thousan' crows". Your movements annoy them, and since it is nearly dusk, they repair to a sleeping roost in a grove of trees. In a moment the sky is black with them, and their offensive calls fairly ring around the countryside as they fly toward a wooded area not far away. Their blackness rejects the color and beauty that has been observed during the day, but the sunset on the horizon is splendid with the most magnificent hues.

The black trees in the distance are outlined sharply against the snow, reminiscent of black against ivory keys on a piano. Live evergreens not far away are sharply contrasted against the bare deciduous trees. All is not black, brown and white in this world, however, for multi-colored lichens, fungi and close-cropped mosses seem virile among the dead grasses and leaves.

Life is seen to be omnipresent on a dynamic stage in winter if only its superficial shell be penetrated. If you are tolerant with the elements, new and fruitful secrets unfold themselves. By adapting yourself to the dictates of winter, perhaps your reward will be the sight of the handsome acrobat of the woods, the white-breasted nuthatch, but lack of harmony with this season may result only in cries of derision from the blue jay.



THE DISTRIBUTION OF LAND AND FRESHWATER SNAILS IN JEFFERSON COUNTY, WEST VIRGINIA

by

M. S. Briscoe

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Jefferson County is the easternmost county of West Virginia. It lies within latitudes of $37^{\circ} 7'$ and $39^{\circ} 43'$ and longitudes $77^{\circ} 45'$ and $78^{\circ} 30'$, and comprises an area of 212 square miles.

The topography is marked with ridges, valleys, and mountains. The eastern border of the area extending from Harpers Ferry towards the south is formed by the Blue Ridge. The height of the ridge ranges from 1000 to 1100 feet at the north and 1600 to 1700 feet at the south line of the county. From the South Mountain in Pennsylvania the Blue Ridge extends south into Virginia.

The eastern side of Jefferson County is drained by the Shenandoah River. This river enters the Potomac, of which it is the principal tributary, at Harpers Ferry. It has a North Fork and a South Fork which unite at Riverton. The source of the North Fork is 7 miles north of Harrisonburg, Virginia. The South Fork rises southeast of Greenville in Augusta County, Virginia. The total length of the river is 170 miles. From its source in Augusta County it flows northeast, on the west side of, and parallel to the Blue Ridge.

The large long branch run of this river on the east is Furnace Run. This stream drains the southeast corner of Jefferson County and reaches the Shenandoah east of Mannings Ferry.

On the west, the southern part of Jefferson County is drained by Long Marsh Run. The source of this run is near Rippon. It reaches the Shenandoah at Boyds Ferry.

The area centered around Kabletown, Aldridge, and Summit Point is drained by Bull Skin Run. Its north fork rises south of Aldridge. The south fork has its source near Summit Point. It enters the Shenandoah north of Meyers Ferry.

The section west of Aldridge and east of Charles Town, and continuing south to the Shenandoah at Bloomery is drained by Evitt's Run.

The area just to the north of Charles Town is drained by Flowing Springs Run. This stream, after flowing past Halltown, reaches the Shenandoah at Millville.

That portion of Jefferson County between Morgan Grove and Uvilla is drained by two forks of Rattlesnake Run. This stream reaches the Potomac northwest of Moler Crossroads.

The area southwest of Kearneysville is drained by two branches of Shaw Run. These branches unite at the county line. Shaw Run then flows northwest and empties into Opequon Creek in Berkeley County. This creek reaches the Potomac two miles east of Bedington.



PLATE I
A MAP DIAGRAM OF JEFFERSON CO. W. VA., TO SHOW LOCATION OF
COLLECTING STATIONS

Cattail Run has its source to the north of Charles Town. It flows through this city and continues eastward to the Shenandoah River into which it empties near Keys Ferry.

Leetown is drained by Hopewell Run. This is a tributary on the east side of Opequon Creek. Turkey Run, which is also a tributary on the east side of the Opequon, drains Middleway.

Rock Marsh Run has its source near Kearneysville and reaches the Potomac near dam No. 5.

The chief drainage stream of Jefferson County is the Potomac River. It is formed by the junction of two rivers. The river called the North Branch rises in the western Alleghenies and the South Branch in the central Alleghenies. These branches unite about 15 miles southeast of Cumberland, Maryland. From the junction of these two head streams the river reaches the Chesapeake Bay after a course of 400 miles. The entire drainage, then, of Jefferson County is through the Potomac into the Chesapeake Bay and the Atlantic Ocean. This county does not feed the Ohio drainage. (Plate 1).

Land snails, when migrating, tend to follow the water courses. They are aided greatly in their distribution through this medium. This is due to the favorable habitat furnished by the cover that borders streams and by the fact that in flood time many of the snails are carried from up-stream farther down, and, upon becoming stranded in a suitable locality, may continue propagating the race. Drainage streams are natural paths of migration.

In this study 69 species of snails were collected from 33 localities; 3 species are new to West Virginia. Many of the helicids and pupillida are widely distributed throughout the entire county. Specimens and localities are listed on Plate 2.

The diversity of the habitats, together with an abundance of plant foods and available calcareous soils, render Jefferson county a favorable area for a large variety of gastropods.

Acknowledgments

I wish to thank Dr. Paul Bartsch and Dr. J. P. E. Morrison of the U. S. National Museum, and Dr. S. T. Brooks of the Carnegie Museum, for identifying many specimens and for valuable literature.

References

- Baker, F. C. The freshwater mollusca of Wisconsin. *Wis. Geol. and Nat. Hist. Surv.* Madison, 1938.
- Brooks, S. T. The shelled molluscs of West Virginia in the collection of the Carnegie Museum. *Annals of the Carnegie Museum.* Vol. 24, pp. 61-68. 1935.
- Ortman, O. E. The Alleghenian divide and its influence upon the freshwater fauna. *Proc. Amer. Soc. Vol. Vol. 52, No. 210.* May-Aug. 1913.

BONAPARTE' GULL AND AMERICAN PIPIT IN WINTER

by

Hervey Brackbill

In their "Preliminary List of the Birds of Maryland and the District of Columbia," Hampe and Kolb report no January dates at hand for Bonaparte's Gull (*Larus philadelphia*) and no mid-winter dates for the American Pipit (*Anthus spinoletta rubescens*). I can supply both of these.

Bonaparte's Gull. On January 13, 1946, there were about 20 Bonaparte's Gulls on the mud flats just off Reed Bird Island, at the Hanover Street Bridge, in Baltimore, along with about 1,000 Herring Gulls. This was an isolated visit to Reed Bird; I do not know whether this gull is present there regularly in winter. My notes for the day say:

"The only gulls I could discover that were not Herrings were about 20 of the sprightlier little Bonaparte's. These were all adults in winter plumage—their white primaries more prominent, incidentally, when the sky clouded over than when the sun lighted up also the gray of their mantles.

"The Bonaparte's Gulls foraged continuously over the mud, and regularly kept much nearer the shore than the main mass of Herrings, often foraging virtually up to the edge of the reeded island—the reeds now, of course, all dead and often fallen, and the island actually rimmed for a varying number of yards with flotsam of every sort: boards, boxes, beams, branches, whole tree trunks, and what not.

"These gulls walked about over the mud with nodding heads, dabbling frequently in the mud, much in the manner of pigeons or doves. Every now and then, also, one or two would fly a couple of yards. Sometimes, too, one would fly almost straight up in the air a foot or two and drop right down again—possibly to free sinking feet from the muck, I thought."

American Pipit. A bird of this species seen in Baltimore City from January 27 to 29, 1939, at a place I was watching regularly, plainly appeared as the result of a cold gale and was not a winter resident. My other mid-winter date, January 29, 1945, fell during somewhat similar weather, but this bird was found on a random walk in another part of the city and I know nothing about the length of its stay. My notes say:

"January 27-29, 1939. On the afternoon of January 27, just two days after a 24-hour westerly gale suddenly drove in the coldest spell of the winter, an American Pipit turned up on one of the smaller sports fields in Hanlon Park, in northwest Baltimore. It stayed till at least noon on the 29th—at that very same place.

"The bird seemed to feed continually. One half of the field was almost entirely coated with a thin, icy remnant of snow, and part of the time the ground was frozen hard, yet no matter when I looked—and I watched for some minutes on both of the first afternoons, and off and on through a great part of the last morning—the bird was always foraging; sometimes over the bare spots among the ice, sometimes on the clear half of the field.

"It acted like a Starling: bent its head down, and jerked it, as it walked, and zigzagged to right or left at nearly every step; and it wagged its tail—or, rather, the whole hind part of its body—like a Spotted Sandpiper. It was extremely dark in coloration. The white in its tail showed only when it flew—low over the ground, and swiftly.

"The fact that the change in weather was from warm to cold, and not the other way around, seems evidence enough that this bird was not an early migrant but was blown or fleeing before the cold snap, which sent the temperature down to minimums of 17 and 18 degrees for three days running. On the other hand, the Pipit stayed here through one day when the minimum was only 23 degrees.

"After noon on the 29th, I had no chance to look for the bird until the afternoon of the 31st; then it was gone. The weather had become comfortable again in the meanwhile."

"January 29, 1945. In a flat field of rather tall, clumpy grass that was covered with snow between the tussocks, lying along the left bank of Gwynns Falls a short distance above the Hilton Street bridge in Baltimore, I flushed an American Pipit this afternoon. It flew with loud and rather sweet *tsip*'s, given in irregular groups—there were four, one and two in one series—to a tree on the edge of the field, and sat there for a bit, perhaps 25 feet above the ground.

"The white tail feathers were visible both in flight and while perched, and even in the tree the bird wagged its tail characteristically. After a little while it took flight again and apparently returned to the field, for I heard some calls toward the ground although I didn't actually see the bird there again. Occasionally the call notes sounded like *sip*, rather than *tsip*; when a number were given in a string, the final one seemed to be accented.

"From January 24 on the daily mean temperature has been 6 to 18 degrees below normal except on one day; on the 25th the range was 11 to 22 degrees. The snow on the ground, however, for the most part dates back to January 16."

NOTES FROM FIELD AND LABORATORY

COMMON MUD TURTLE ATTACKING FOWLER'S TOAD

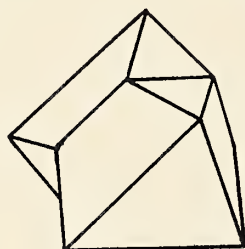
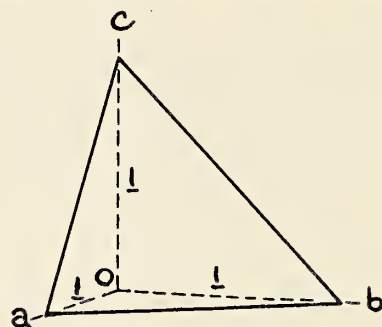
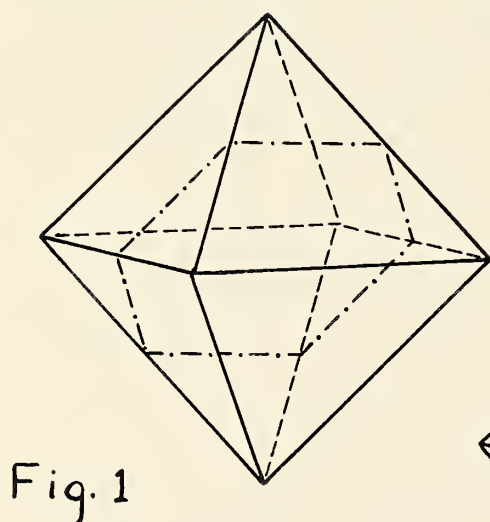
On April 18, 1942 Harry Howden and I observed a most interesting situation in a pond next to the road leading to Gibson Island, Anne Arundel County, Maryland. The pond was very shallow and studded with dead stumps. We were surprised to find a number of Fowler's toads, *Bufo woodhousii fowleri* Hinckley, breeding at midday in this pond. While investigating, we noticed two clasping pairs of these toads struggling in the water, occasionally disappearing from sight. Each pair would reappear at the surface, only to repeat the previous actions. Upon closer inspection it was found that they were being attacked by mud turtles, *Kinosternon subrubrum subrubrum* (Lacepede). These toads were collected and examined and it was found that each clasping pair was being besieged by a pair of these turtles. It seemed likely from the many dead

toads at various stages of decay that these "attacks" had been going on at least a week, but actually only two separate attacks were observed. This places the mud turtle on the list of enemies of Fowler's toad, at least in springtime. The turtles appearing in pairs at this time of year may be an indication of their mating season. More information concerning this subject is very much to be desired.

John E. Norman

A MAGNETITE TWIN FROM HARFORD COUNTY, MARYLAND

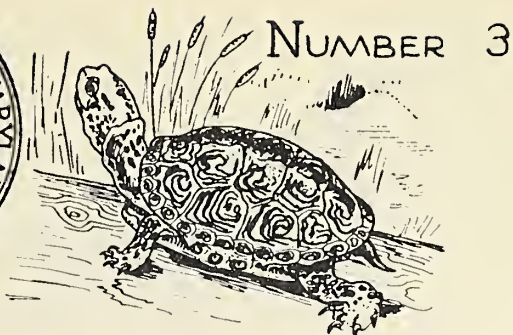
A single twin crystal of magnetite ($\text{FeO} \cdot \text{Fe}_2\text{O}_3$) was collected at the Dinning Rutile Mine recently by Rodman McCoy. Magnetite at this locality occurs abundantly as crystals in chlorite with rutile crystals and white masses of apatite. The country rock is a compact steatite schist and serpentine. (1)



The habit of the mineral here is in octahedrons, (111), slightly malformed. Figure 1 is a normal octahedron of the isometric system. The general symbol (111) refers to the fact that a face on the crystal intercepts the three coordinate axes in equal distances (Fig. 2). In this specimen (Fig. 3), twinning has taken place by a rotation of 180 degrees of one part of the crystal with respect to the other about an axis common to both, the twin axis, which is perpendicular to a plane, the twin plane. This twin plane (dot-dash line in Fig. 1) is parallel to a face (111) so that it may be said the crystal is twinned on (111). This is the Spinel law of twinning, so called because it is common in the mineral spinel, (MgAl_2O_4). The crystal grew this way. It measured 2.5 mm. on an edge. This marks the first observation of such a unique crystal from the locality.

(1) Minerals of Maryland, The Natural History Society of Maryland, 1940

Joseph F. Schreiber, Jr.

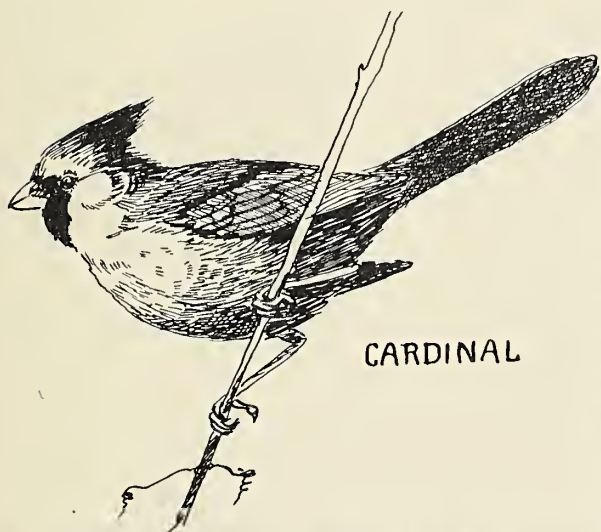


MARYLAND NATURE LEAFLET

WINTER BIRDS IN MARYLAND

by

Irving E. Hampe



CARDINAL

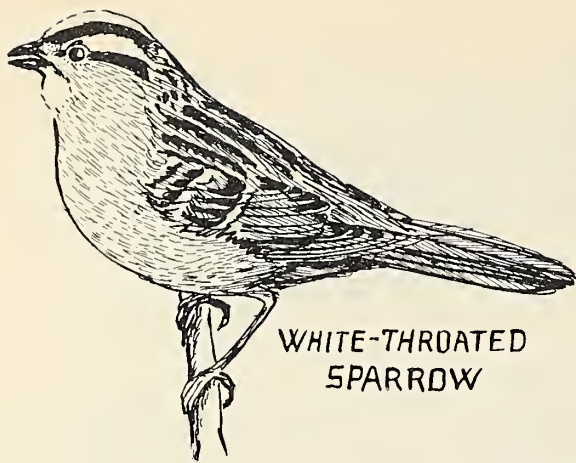
When winter's icy grip holds fast to the countryside and the daylight hours are short, then is the time we can most easily begin to learn to know the birds. In winter the number of species is small, while the individual birds may be numerous. In winter, too, the birds are active - a great advantage when we are seeking them to study - for they have but few daylight hours in which to find the food which must keep them warm during the long hours of darkness. Indeed, food is so eagerly sought that we can soon attract all the kinds of birds to be found in the neighborhood by setting up a feeding station. If our shelf or shelter is located near a convenient window we have a fine opportunity to watch the birds

at close quarters. Even if we choose the harder way to knowledge, and go forth to observe the birds in woods and fields, the bare branches of the trees and bushes enable us to see much more than is possible in summer when the leaves everywhere form a thick screen.

Of course, if we seek afar through many kinds of country, in the forest, through swamps and marshes, along the beach, and across the rivers and creeks of the Chesapeake, we can find dozens of different kinds of birds in Maryland, even in the middle of January. Here, however, we are discussing only the commonest kinds to be found in suburban gardens and parks or about the farmhouse. Missing from our illustrations are the familiar blue jay, the frequent mockingbird, and the immigrant starling and house sparrow, together with others which may be locally common. But if you can thoroughly learn these ten by the end of February, you will be well started on the great game of birding.



SONG
SPARROW

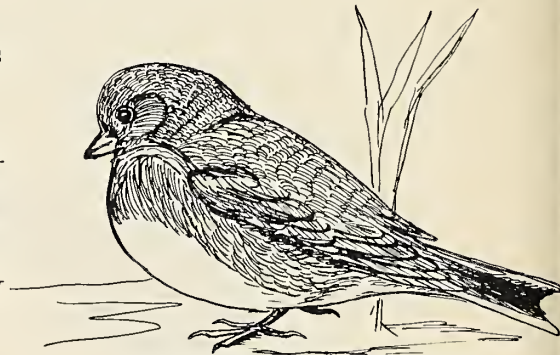


WHITE-THROATED
SPARROW

Of all the smaller birds which remain with us through the winter, the *cardinal* is by far the most brilliant. The glowing form of the redbird with his streaming crest and black mask flashes most unexpectedly across the white world of snow. The female is just as active as he but duller, grayer in coloration and less apt to attract our attention. The cardinal is to be found wherever there are brushy tangles or bushes to offer protection. In sheltered ravines and river bottoms small flocks may gather during the coldest part of the winter. Nearly every feeding shelf has a cardinal or two as regular visitors. They are seed-eaters, as their heavy

bills show, but they will also eat suet. Warmer days in winter often give us an opportunity to hear the loud, clear whistling song. As spring approaches the song becomes more frequent and the colors of the male become even more brilliant. The cardinal is a permanent resident and so we need not say good-bye to him with the passing of winter.

Another permanent resident is the *song sparrow*. It has no bright colors to recommend it, but it is a friendly bird which comes readily to the feeding shelf. We can easily recognize this neat brown sparrow, heavily streaked below with a large spot in the center of the breast. Song sparrows are seldom found far from water. Heavy brush, into which they can dive when danger threatens, seems to be necessary for them also. They are seed-eaters and usually feed on or near the ground. In winter they do not generally form flocks themselves, though they may join groups of other birds. At the feeding tray, song sparrows become quite fearless and, having once become accustomed to the situation, individual birds can be counted on to appear regularly during the winter. Because they are so easily observed they have received much attention from bird students and the life history of the song sparrow is probably better known than that of any other bird. By means of banding — marking individual birds with numbered leg bands — it has been shown that some song sparrows migrate and others do not. Occasionally, individuals may migrate one year and winter on their breeding area the next. The life story of individual birds is fascinating and while all of us cannot band birds, we can often identify the regular visitors to our feeding shelves by small variations in plumage or behavior and so get to know the life of our guests more intimately.



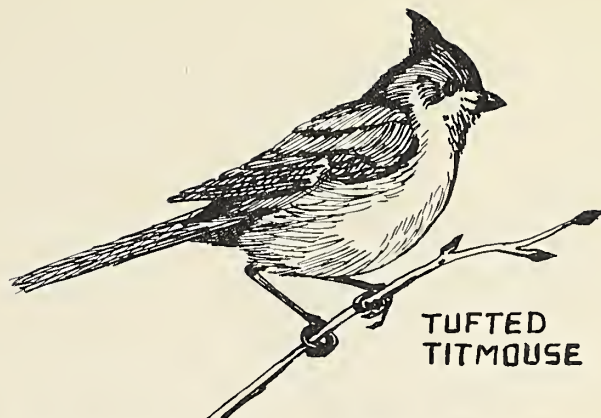
SLATE-COLORED JUNCO



TREE
SPARROW

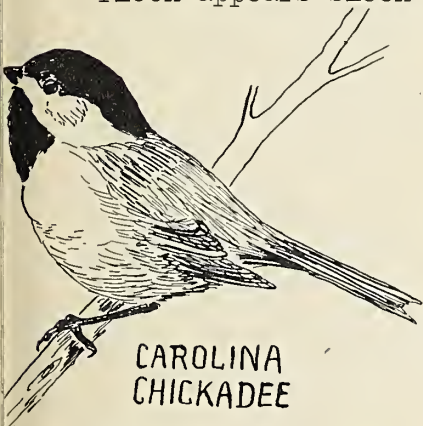
The *white-throated sparrow* is slightly larger than the song sparrow and rather more handsome. Adult birds have a white throat patch, a head contrastingly striped with white and black, and a yellow spot in front of the eye. White-throats are sociable birds and live in flocks spending much time on the ground where they may do a good bit of scratching among the leaves in thickets and on the edge of the woods. A flock, which usually contains a majority of much

duller immature birds, can easily be attracted to the feeding shelf, particularly in periods of bad weather, and will eat all kinds of seeds. As spring approaches the white-throat may blend his sweet and plaintive voice with the cheerful songs of the cardinal and song sparrow, but he will not stay to nest here. Some of his kind may linger about into the month of May but at length all will be off to the north not to return until the first crisp days of fall.



TUFTED
TITMOUSE

With the white-throat in the autumn comes the *junco*, which is often known in Maryland as the snowbird. Plain but neat and trim is the dress of the junco, fitting well the modest and simple nature of the bird. A flock appears sleek and dignified when at rest, with slate-gray upper parts and white bellies, but when the birds fly about in a snow storm they remind us of animated snowflakes themselves as they flash white outer tail feathers. In good weather small flocks rove about the countryside, enlivening the leafless thickets and the brown fields for us. But when ice and snow appear they join together in larger bands and drift in toward farmyards and suburban gardens. Easily attracted to our feeding stations, juncos are certainly one of the most charming of our winter birds.



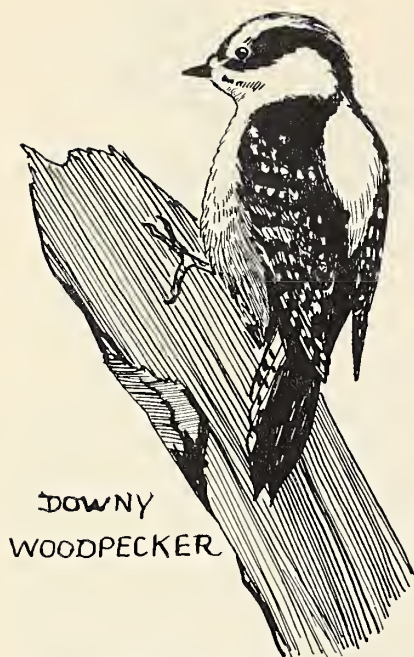
CAROLINA
CHICKADEE

The *tree sparrow* is another visitor from the North. It arrives much later in the fall than the white-throat and junco and leaves again early in the spring. It is a hardy bird which seldom visits the feeding shelves, but prefers to live in weedy fields and marshes. There flocks roam merrily about even in the worst winter weather, uttering a sweet confusion of sharp, tinkling notes which exactly suit the crisp winter air. We may find it well worth our while to visit the haunts of the tree sparrows, to listen to their gay chatter, and to watch their active movements. The bright, reddish-brown cap and the single spot in the middle of the plain, unstreaked breast are the recognition marks of these beneficial destroyers of weed seeds.

However, the seed-eaters are not our only winter birds. Dormant insects, insect larvae, and their eggs furnish food for many birds and the beady black eyes of the *tufted titmouse* are just the thing for searching them out. About the size of our wintering sparrows, the titmouse is clad in gray and white with rusty sides, but the tufted crest and the jaunty angle at which it carries its tail make it seem slimmer and longer. Titmice rove the woods with chickadees and kinglets but will come to feeding stations when suet is supplied or foods which are rich in protein, like peanuts.



WHITE-BREASTED
NUTHATCH



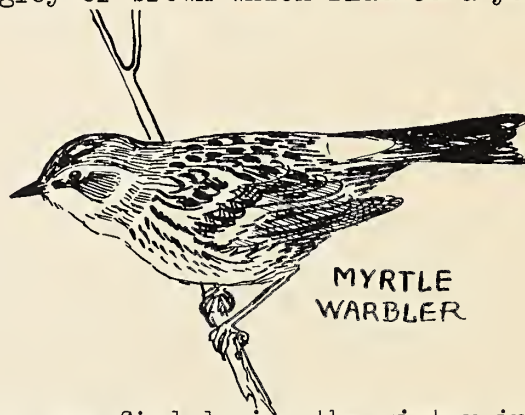
DOWNY
WOODPECKER

The cheery "fee-bee" of the *Carolina chickadee* resounds through the woods even during the coldest weather. This active little bundle of feathers, easily recognized by the combination of black cap, black bib, and white cheeks, troops about in loose flock formation with titmice, kinglets, and woodpeckers, flitting among the smaller branches and occasionally hanging upside down as it probes into crevices. Like the other insect-eaters with which it associates, the chickadee is fond of the suet provided at the feeding shelf.

"Upside-down bird" is the name often given to the *white-breasted nuthatch*. Nuthatches are not quite as sociable as other winter birds and are often found quite alone in the dark winter woods talking nasally to themselves with a penetrating "yank-yank" as they wander near-sightedly down a tree trunk head first. Nevertheless, they are not such hermits that they cannot be lured out of the woods with a piece of suet tacked to a tree trunk.

The commonest winter woodpecker in Maryland is a little black and white one with a puny "bark-sticker" which is much shorter than the length of the rest of its head. The male *downy woodpecker* has a small patch of red on the back of his head. The downies work industriously to satisfy their great cold-weather appetites and, as they search out hidden grubs and insect eggs, particularly on the smaller trees and even on bramble canes and stout weeds, they destroy innumerable bugs harmful to our fields and forests.

May is the real warbler time. But there is one which regularly braves the Maryland winter, the *myrtle warbler*, a slim bird of grey or brown which flashes a yellow rump as it works through second growth woodlands or along hedgerows, giving forth a sharp and business-like "check" which fits in with the seriousness of winter but somehow does not seem very warbler-like. And business-like the myrtle warbler must be, for it, like all our winter birds, must somehow find food enough in the short winter days to keep alive the spark of life through the numbing chill of the long nights.



MYRTLE
WARBLER

If you would like to know what other birds you may find during the winter in your part of Maryland, send for the list of the birds of Maryland published at the address below (\$1.00). Chapman's "Our Winter Birds" is a good introduction to the life of our birds in winter and Baker's "Audubon Guide to Attracting Birds" will tell you about feeding shelves.

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BIRD-FOOT VIOLET



Photographed
by
Earl H. Palmer



MARYLAND NATURALIST

The Natural History Society of Maryland

SPRING 1948

VOLUME XVIII No. 2



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MARYLAND NATURALIST



Conservation is fundamentally an attitude. Attitudes are not imposed nor are they taught. Attitudes can be instilled by subtle propaganda and innuendo but attitudes to be worth anything must be consciously constructed. Good and useful attitudes must rise on a foundation of sound and unbiased information activated by basic ethical principles. At the root of a sound conservation attitude lies a love of nature grounded in understanding of natural law.

The Natural History Society of Maryland is not a propagandist organization. It seeks only to disseminate facts. Yet natural facts may in time lead to their human implications. Thoreau said, "The eye which can appreciate the naked and absolute beauty of scientific truth is far more rare than that which is attracted by a moral one. Few detect the morality in the former or the science in the latter." Conservation practice is doubly difficult in that it requires both of these gifts of insight. There is probably no lack of moral good-will in our State but there is an appalling ignorance of the natural environment in which we live.

The Natural History Society of Maryland in this magazine and through other means will continue to combat this ignorance. It is our aim to furnish information - not on "natural resources", not merely as an inventory of supplies to be consumed in our economy; but information on the Maryland of rocks and soils and waters, of animals and plants, of processes like erosion and diastrophism and weather, information on all those things which form the fabric into which the scarlet human thread is tightly woven though we be unconscious often of the rest of the cloth.



Haven Kolb

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WINTER, SPRING, SUMMER, FALL

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VOLUME XVIII No. 2
SPRING 1948



Photographed by Gilbert Klingel

Brown Thrasher, a bird of the hedgerows and forest edge.

THE ECOLOGICAL DISTRIBUTION OF BIRDS

by

Robert E. Stewart

Fish and Wildlife Service

During recent years growing concern has been felt over the effects of certain wide-spread land-use and management practices on our native bird-life. The drainage of our swamps and marshes, dredging of our streams, burning of our brush-land and clear-cutting of our forests are a few of the practices which are known to have a major effect on bird populations. Many other changes wrought on our fields and forests by the hand of man may have a less severe but nevertheless important effect on our feathered friends. Before we can determine and fairly evaluate the more subtle effects of some of these practices, it is necessary that we first have some understanding of the normal abundance and ecological distribution of birds. This information may then be used as a background for an intelligent approach to such problems.

The ecological distribution of birds is orderly although complex, due to the large number of limiting factors which are involved. The composition of the biotic community which represents the natural ecological unit in the distribution of plants and animals, is affected primarily by its location in relation to evolutionary centers in the world, by climate, by the stage of development of plant and animal successions and by seasons.

The major seasonal changes in bird populations which are intimately associated with migrations, breeding activities and food supply, are so widely known that there is little reason to elaborate on them here. However, the close correlation of bird populations with various types of environment is not so generally appreciated.

REGIONAL DISTRIBUTION OF BIRD POPULATIONS

The classification of biotic communities involves a consideration of the place of origin of the component species of plants and animals as well as the important factor of climatic variation. The principal centers of evolution and distribution of the plants and animals of the world cover at least eight major regions or realms, each of which is characterized by certain predominating groups of endemic plants or animals. These realms are listed and roughly defined as follows: (1) Australian (including Australia, New Zealand, New Guinea and Polynesia), (2) Oriental (including India, Indo-China, Malaysia, and most of the East Indies and Philippine Islands), (3) Ethiopian (Africa, south of the Sahara Desert), (4) Neotropical (South and Central America), (5) Antarctic (Antarctic continent), (6) Arctic (including circumpolar arctic tundra region), (7) Palearctic (including temperate Europe, Asia, and North Africa), and (8) Nearctic (North America north to the limit of tree growth). Each of these realms may contain elements within its native fauna or flora which are not endemic but which were derived from the faunas or floras of other realms, having spread through migration or other means to new areas. The composition of the species of birds of the Nearctic region is a good example of this.

Here the temperate North American element (warblers, vireos, sparrows, etc.) comprises the greatest number of species and individuals, although the South American or Neotropical element (flycatchers, tanagers, humming-birds, etc.) and the temperate old world or Palearctic element (nuthatches, titmice, thrushes, etc.) are represented in fair numbers too.

Within each realm, plants and animals may be found associated in an orderly pattern of biotic communities which are distributed in such a way as to indicate that climatic conditions are of paramount importance as a governing influence. Every climatic zone has characteristic associations of plant and animal life which comprise a distinct composite community. In the southeastern United States such birds as the chuck-will's-widow, red-cockaded woodpecker, brown-headed nuthatch, painted bunting, yellow-throated warbler, pine warbler, Swainson's warbler, and Bachman's or pine-woods sparrow may be found associated in the same region with loblolly pine, long-leaf pine, slash pine, cypress and a great variety of southern hardwoods. A little to the north one will find other associations in the so-called central hardwoods region. Here the cardinal, tufted titmouse, hooded warbler, Kentucky warbler, Carolina wren, red-eyed vireo and Acadian flycatcher are found in the same region with a large number of species of oaks, tulip poplar and many other hardwoods. Still further to the north through most of the North Atlantic, New England and Great Lake States one enters a mixed coniferous-hardwood forest where trees such as white pine and hemlock are associated with many northern hardwoods including sugar maple, basswood and yellow birch. The birds that are common in this region include the least flycatcher, veery, rose-breasted grosbeak, and many different warblers such as black-throated blue, black-throated green, chestnut-sided and black-burnian. Beyond this area a transcontinental belt of coniferous timber occurs, where spruce grouse, Canada jays, olive-sided flycatchers, olive-backed thrushes, brown-capped chickadees, black-poll warblers, etc. are associated with balsam fir, spruce, tamarack, jack pine and varying amounts of aspen and paper birch. Many other zones with their characteristic plant and animal associations are found over the remaining portion of North America and in the other realms as well.

Minor differences in climate within each zone may often be correlated with corresponding small changes in the plant and animal associations. Areas within a major zone showing such differences are often designated as associations. For example, the lower portion of the Del-Mar-Va peninsula (including southern Delaware, lower Eastern-shore Maryland and Eastern-shore Virginia) lies within the southern pine region, but its slightly lower average annual temperature as compared with the southern part of the region is reflected in slight differences in the vegetation and animal life. In this northern portion, loblolly pine is probably the most important dominant tree while the other southern pines such as slash and longleaf and certain other typical plant species as well, are entirely absent. Differences in the bird life are also noticeable, such species as the red-cockaded woodpecker, painted bunting and Bachman's sparrow being either absent or extremely rare, while other typical species such as the chuck-will's-widow, brown-headed nuthatch and yellow-throated warbler are fairly common. Thus, the lower part of the Del-Mar-Va peninsula may be considered a well-marked association of the southern pine region.

Temperature and moisture are probably the two most important climatic factors which exert a controlling influence on the environment and which determine the type of biotic communities to be found in any one area. Temperature plus the combined effect of temperature and moisture which may be expressed in terms of a precipitation-evaporation ratio, determine the life forms of the mature or climax plant and animal association whether it be desert, grassland, brushland, forest or rain forest. The similarity of the life forms of regions with corresponding climate in different realms is quite striking. This may be illustrated by comparing the Steppes of Russia with the Great Plains of North America. The climate and general appearance of these two regions are practically identical, although their respective biotic communities are composed of species which are quite different.

The combined effects of temperature and moisture on biotic communities become quite evident as one travels north or south through various climatic zones each of which may be correlated with distinct types of habitat. Similar changes in habitat may also be noted in traveling with increasing or decreasing altitude in mountainous regions. Roughly speaking, a change in altitude of 100 feet is equivalent to a change in latitude of 17 miles. The tops of many of the higher ridges and knobs of the southern Appalachian Mountains in the eastern United States are covered with a coniferous forest that corresponds quite closely in general aspect to the forests in the boreal zone. Here one may find the winter wren, brown creeper, red-breasted nuthatch and others apparently as much at home in summer as they are in the extensive transcontinental coniferous forests far to the north. However, because of the isolated and southern location of these mountainous forests, there are many differences that are apparent. Many of the characteristic plants and animals of the northern forest are absent in these southern outposts while others that do occur have been found to be racially different. Because of this, the southern Appalachian coniferous forest should probably be considered as a distinct association of the northern coniferous region.

Within the major climatic zones, may frequently be found certain areas, generally restricted in size, which have a micro-climate of their own that is quite different from the prevailing climate of the region in which they are situated. This difference in climate may be due to differences in exposure, soil conditions or other factors. In the northern hemisphere the north slope of a hill or mountain will generally have a considerably lower temperature and a greater amount of moisture than the surrounding areas and, if this difference is pronounced enough, may support a biotic community that is characteristic of a climatic zone with lower temperature and higher humidity. Certain soils have a much greater moisture-holding capacity than others, which is reflected in differences in habitat. The sand hills of Nebraska located within the Great Plains region are an extreme example of this type. Because of their greater water-holding capacity, the sand hills support a tall grass association which is characteristic of the more humid prairie or oak-savanna region to the east. Such areas are frequently referred to as relict areas due to the fact that many of them have been able to persist through major climatic changes from a time when the climate and habitat of the region in which they are situated was comparable. At the margins of relict communities, certain species are sometimes found associated which are generally not found within hundreds of

miles of each other. An example of this might be an association of southern birds, such as the Carolina wren, hooded warbler and yellow-breasted chat, with the northern mourning warbler, olive-backed thrush and winter wren. Such an association occurs rarely around the margins of a few relict bogs in the mountains of eastern United States.

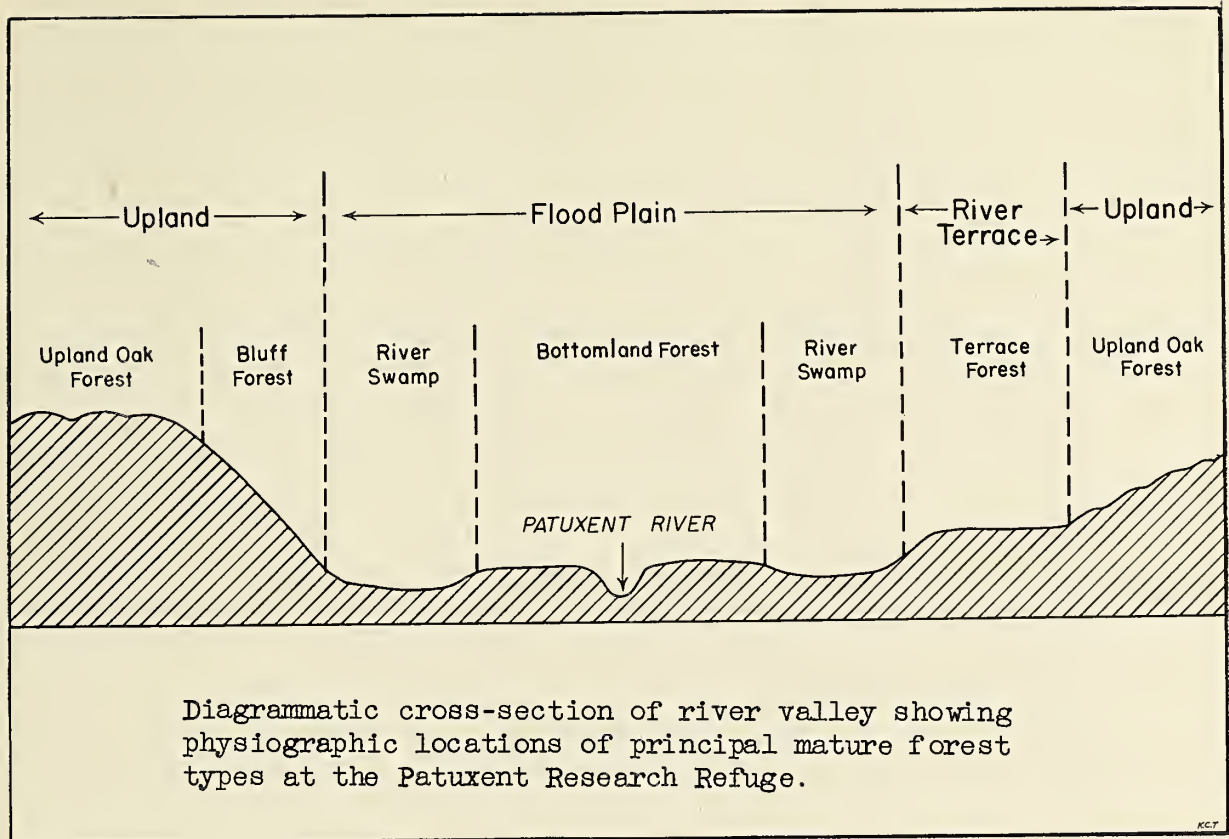
Thus it may be seen that distribution of birds over the globe is no haphazard or random matter. Along with plants and other animals they are generally found to be associated together in fairly definite and recognizable biotic communities. The boundaries of these communities do not necessarily represent the limits of geographical range of any individual species of plant or animal but do represent the limits of its association with certain other species.

LOCAL DISTRIBUTION OF BIRDS BY HABITAT

Each province or district is composed of a considerable number of distinct types of habitat which may represent different developmental stages in the growth of a mature biotic community. The ultimate or final stage, which is often referred to as the climax, is the only one of these that may be regarded as being stable. The other stages which precede the climax in an orderly succession are more or less temporary, some of the earlier stages existing for a relatively short period. In regions of diverse physiography, some of the sub-final stages are kept in a semi-permanent condition due to the action of certain environmental factors. A river flood-plain community, which usually precedes a better-drained climax, is a good example of this. Since there are a limited number of species of plants and animals which are able to withstand the conditions brought about by repeated flooding, the rate of change is in this case greatly retarded.

The Patuxent Research Refuge of the U. S. Fish and Wildlife Service, located near Bowie, Maryland, has a varied breeding bird population which may be used to illustrate the local distribution of birds by habitat. Detailed population studies of birds, covering all of the major habitats, have been made here during the past four years. This refuge lies within a coastal-plain or pine-oak association of the central hardwoods region. Three distinct physiographic types are present: (1) a gently rolling upland, (2) a flood plain of the Patuxent River which runs through the refuge, and (3) a river terrace which represents the remains of an old alluvial plain. Most of the primary stages of succession of biotic communities are found on the flood plain, while most of the secondary stages are developing on the terrace and upland following logging and abandonment of cultivated land. Each of these stages, whether primary or secondary, has its characteristic association of plants and animals.

The initial stage of primary succession on the flood plain of the refuge is what is called "marsh-meadow," which is made up of a dense growth of semiaquatic, emergent vegetation. This stage is not used as a nesting habitat by birds on the refuge, although in certain other regions, marsh-meadows are regularly used for nesting by a few species. The invasion and establishment of several species of shrubs, including alder, poison sumac, buttonbush, and swamp rose, introduce the next stage called "shrub swamp."



Here the Maryland yellow-throat, catbird, and white-eyed vireo commonly make their summer homes. Soon pioneer tree species such as red maple and black gum appear and gradually develop an overhead canopy forming the "transition swamp" stage. As this happens, the sun-loving shrub swamp birds move out while certain forest species, including the red-eyed vireo, hooded warbler and Louisiana water-thrush, become common. The understory shrub layer which has persisted through this stage slowly disappears with the development of a "river swamp," and as it does so, the hooded warbler is the first bird to leave. Gradually, with the accumulation of humus and litter the community becomes better-drained, and its composition of plant and animal species becomes more varied until the bottomland forest stage is attained. In this rich and productive community, plant and animal species may be seen in profusion. Sweet gum, beech, tulip poplar, hornbeam, elm, pin oak, and river birch, to name only a few of the trees, occur commonly and along with them the red-eyed vireo, redstart, parula warbler, Acadian flycatcher, Kentucky warbler, wood thrush, and scarlet tanager may be found nesting in abundance, while many other birds are present too.

The mature biotic communities of both terrace and upland differ from the bottomland forest in many respects. The number of characteristic species is fewer, and at the same time the density of individuals is much less. The two dominant trees of the terrace forest are beech and white oak, while the upland forest is dominated by white oak and scarlet oak. The upland forest, and to a lesser extent the terrace forest, has a definite understory of heaths, which is entirely lacking in the bottomland. The ovenbird,

a common species in the lower strata of the forests of upland and terrace, is not found in the bottomland, where its place is taken by the Kentucky warbler. The wood pewee, black and white warbler, and worm-eating warbler are also largely restricted to the terrace and upland, while certain other species such as the red-eyed vireo, wood thrush, and scarlet tanager are commonly found in all of these forest types.

Sections of the forest on the terrace and upland are frequently cleared for farming, and when this occurs drastic changes in the bird life result. The meadowlark and the grasshopper sparrow are the most characteristic nesting birds of many of the agricultural areas, and occasionally the killdeer, horned lark, and vesper sparrow may be found as well. Since the soil in this region is generally quite poor, many of the agricultural fields are abandoned after a few years' use. When this happens many different weeds, including ragweed, smartweed, and certain legumes, rapidly invade the area and soon become dominant. This type of cover is not used much for nesting, although it furnishes a great deal of food to many of the wintering birds. After three or four years, most of these plants are crowded out by invading broomsedge and certain golden-rods and asters. This new habitat is used almost exclusively as a nesting area by the Henslow's sparrow, which soon becomes common. Gradually a scattered growth of woody plants appears, chiefly Virginia pine in the better-drained sites and sweet gum in the wetter areas. The prairie warbler and field sparrow then become common in summer and scattered pairs of woodcock appear, while the Henslow's sparrow population gradually thins out. Eventually the overhead canopy closes as the trees become larger and more numerous, resulting in pure stands of pine on the better-drained sites. By this time all of the nesting birds of earlier stages have been replaced by a rather sparse nesting population of pine warblers, ovenbirds, and a few other forest species. Since pine is not able to reproduce underneath its own shade, its place is slowly taken by various hardwoods which finally develop into a climax forest. With the exception of the pine warbler, which disappears with the pine, the bird population becomes more varied and abundant with this development.

The population density of birds as well as the species composition in the various habitats varies considerably. In 1945 the bottomland forest was found to contain approximately 388 pairs of nesting birds per 100 acres, whereas in 1944 the terrace forest contained 194 pairs per 100 acres and the mature upland forest only 130 pairs per 100 acres. The abundance of any one species also varies in different habitats. For instance the red-eyed vireo, which is regularly distributed over all of the deciduous forest types, was found at the rate of 92 pairs per 100 acres in the bottomland forest, 37 pairs per 100 acres in the terrace forest and 34 pairs per 100 acres in the upland forest.

The variation in population density of birds in different areas within one habitat is usually quite small. In 1945, three different areas within the bottomland forest were studied intensively. These three areas of 22, 31, and 32 acres were found to have nesting population densities of 373, 414, and 373 pairs per 100 acres respectively.

The population densities of birds in closely related habitats are usually similar. The three principal forest types on the upland, the climax upland oak, the subclimax pine-oak and the north slope bluff forest were found to have nesting population densities of 130, 134, and 126 pairs per 100 acres respectively. The species abundance varied somewhat in these three types although the variation in population densities of certain species was remarkably small, notably, the red-eyed vireo, which was found to have a density of approximately 34 pairs per 100 acres in all three types.

Many areas may be found in most regions which are not representative of any one type of habitat but which seem more or less intermediate between two or more types. Such areas are often known as ecotones and contain overlapping populations of plants and animals characteristic of two or more biotic communities. Usually in such cases the species composition is more varied and the population density higher than in the more typical habitats.

Edge effect is another very important factor having a bearing on the species composition and population densities of animals in different areas. Generally speaking, the greater the number and variety of habitats within an area, the greater the population density. When more habitats are available the habitat requirements of a larger number of species and individuals may be met. Because of this, many animals, including some birds, concentrate in greater numbers near the edges of habitats than in the centers. The edge effect of most landscaped residential areas is very great and dense bird populations are often found on them.

Population studies are fascinating and intriguing as well as being informative and contain many surprises too. We had not expected, for instance, that the density of many small birds was as great as our census figures revealed. For example, Maryland yellow-throats were present at the rate of 108 pairs per 100 acres of shrub swamp, hooded warblers at 62 pairs per 100 acres of transition swamp, prairie warblers at 46 pairs per 100 acres of pine fields and Acadian flycatchers at 39 pairs per 100 acres of bottomland forest. Such figures represent concrete data which are helpful in understanding the true nature and productivity of the natural environments around us.

SHADE TREE INSECTS AND THEIR CONTROL

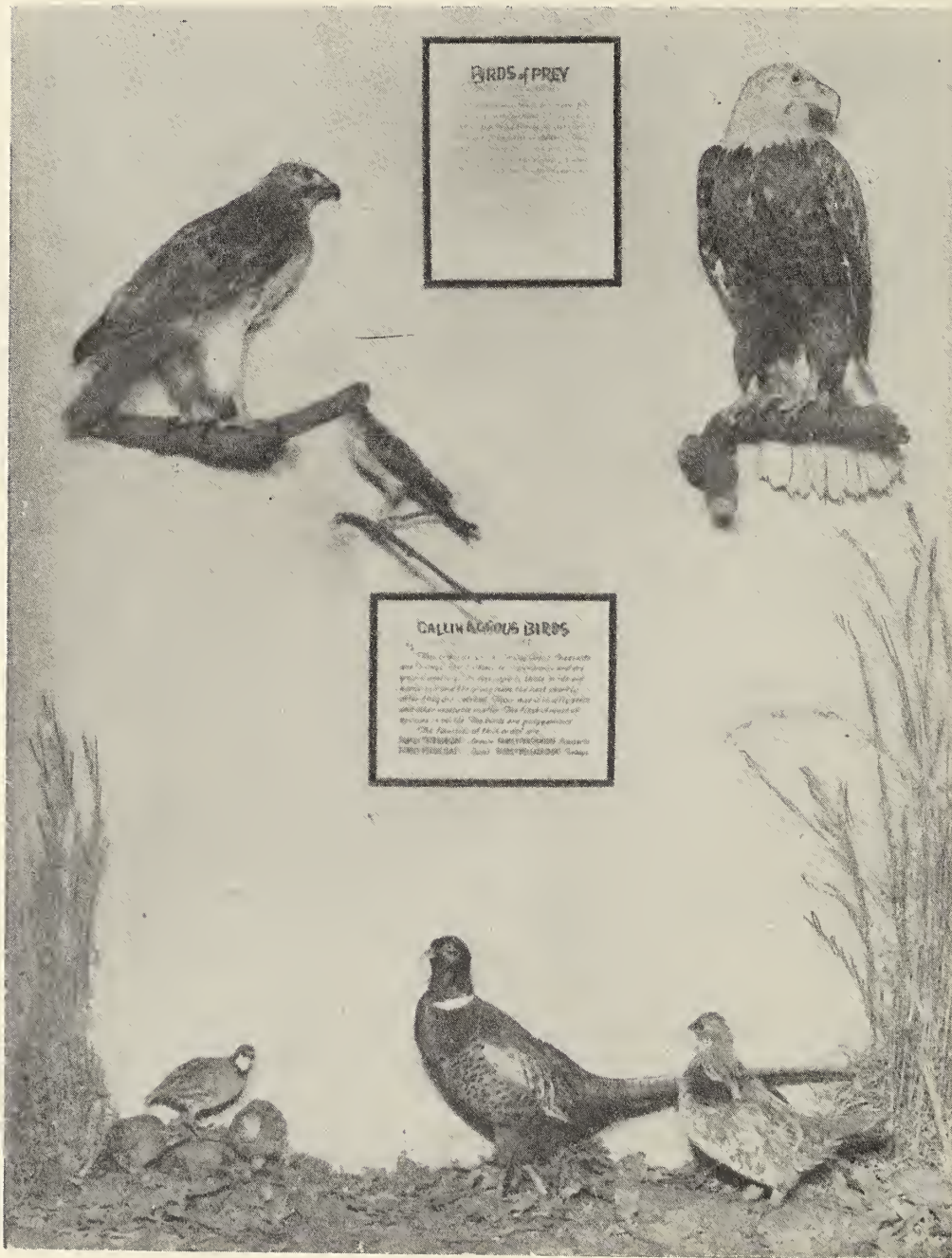
by
Hollis J. Howe

Whether there are more insect enemies of shade trees because there are fewer natural controls than formerly existed may be debatable, but that they are a more serious threat than in the past is a foregone conclusion. Misguided tidiness in the cleaning up of fence corners and thickets, which in the past afforded cover for insectivorous birds, has no doubt had its effect. Beneficial predacious insects may be killed by indiscriminate use of insecticides, particularly the new and highly publicized D.D.T. But perhaps the most serious damage is being done to our most favored shade trees by exotic species of insects.

That there are fewer birds than in years past is obvious. The leaving

Continued on page 32

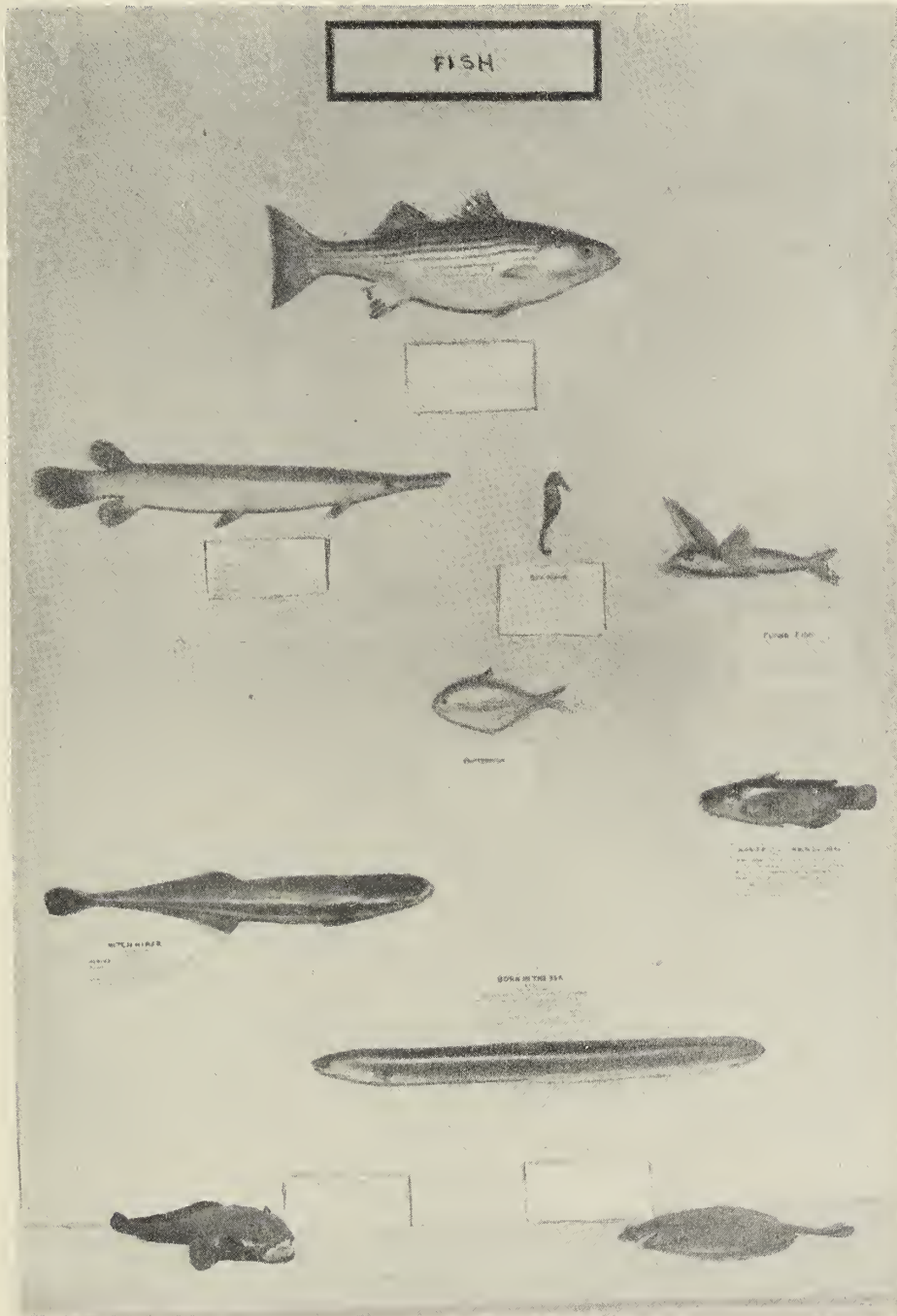
Exhibits from



MARYLAND BIRDS

Many cases are devoted to representative birds of our State. This one shows some of our game birds and raptors, including the National Bird, the bald eagle (upper right).

our Museum



MARYLAND FISH

Maryland is famous for her fisheries. This exhibit shows some of the more singular members of our finny fauna as well as some of those of economic importance.

of food-plants for their subsistence when their favorite insect diet must be supplemented and of evergreen shelter-plants, whether needle-bearing or broad-leaved, has demonstrated how the bird population in a given area may be increased.

Complete data on the effect of such universally recommended contact sprays as D.D.T. and its possible successors have not as yet been fully worked out. It has been shown, however, that sufficiently strong dosages will kill aquatics, amphibians and mammals, particularly where they are confined. These new insecticides are not selective as are the new weedicides. That many beneficial insects are killed is quite probable.

Like some of the newly encountered tree diseases, the more serious contemporary tree insects are of foreign origin. Examples of these which readily come to mind are such pests as the European elm-leaf beetle, the Japanese beetle and the European elm-bark beetle. The first two derive their seriousness from the weakening effect which results from defoliation, whereas the last named is largely responsible for the spread of the Dutch elm disease. (See MARYLAND - Vol. XVII No. 3 - July 1947.) There are other insects which fall in both these categories, and all can be kept in check with properly timed sprays, keeping the trees free of dead wood, and with the aid of such natural controls as birds, predacious insects and diseases. All of the latter should be encouraged but not relied upon entirely, if vigorous tree growth is anticipated.

The application of insecticides, sanitary measures, and nutrients will, no doubt, always be necessary if optimum conditions are to be expected. It is intended here to call attention to some of the more serious trouble makers and to give the most effective controls for them. It should be borne in mind that timing is the essence of any attack which is to be successful.

The European elm-leaf beetle has already been mentioned. A quarter of a century ago this insect confined its attack almost exclusively to the European varieties of elm. During recent years, however, it has taken over the American elm to such an extent as to almost equal the effect of the Japanese beetle on this and other species of this splendid genus. D.D.T. is an effective control but must be applied early - as soon as the new leaves have attained full growth. This material should be applied to the branches and trunk, as well as to the underside of the foliage, so as to kill not only the immature larva of the leaf beetle but also the bark beetles which feed upon crotches of the twigs. Early May is the proper time for this.

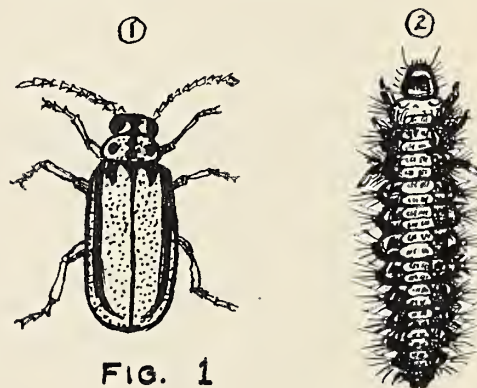


FIG. 1

The Japanese beetle may also be partially controlled with D.D.T. in early July, at which time a second brood of elm-leaf beetles and tussock moths will also demand attention. This spraying will likewise meet the ap-

proved schedule for the bark beetles. Data are incomplete on the effect of D.D.T. on predacious insects such as the Typhia wasps, introduced from the Orient as a natural check. Trapping, of course, has the obvious advantage of arresting reproduction, if begun early enough in the season.

The box-elder beetle is a nuisance in late summer, particularly when the adults begin hibernating inside the houses. Spraying of the trunks of these trees and the outer walls of houses should bring about effective control of these disagreeable pests.

Tent-caterpillars and web-worms call for early application of D.D.T. to be effective. Con-

struction of tents is begun even before the leaves of cherry, apple, and other related genera are fully developed and no material can be effectively applied after the silky mass has been established. An invasion of web-worm on mimosa and honey locust was particularly serious in 1947. Many trees were completely defoliated, with the exception of some little new growth which developed after the insects had completed their life-cycle. Such trees should be watched and sprayed with the first sign of web formation. The fall web-worm calls for similar but later treatment of elm, walnut and Kentucky-coffee trees.



FIG. 3

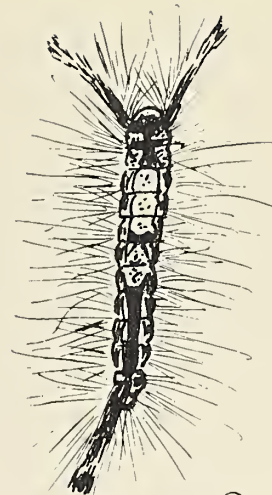


FIG. 2



FIG. 4

Aphids on hawthorns will require mid-summer spraying, whereas the giant aphid on plane-trees (sycamore) and oaks - particularly pin-oaks and red oaks - will need later summer treatment. The effect of D.D.T. on ladybird beetles, so important in the control of aphids and scales, or on such killers as "hobby-horses" (praying mantids), has not as yet been fully ascertained.

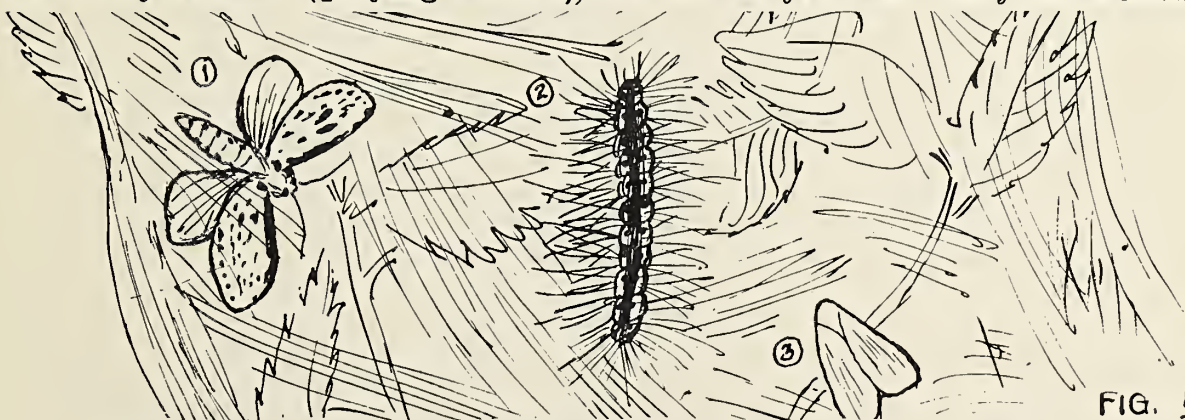
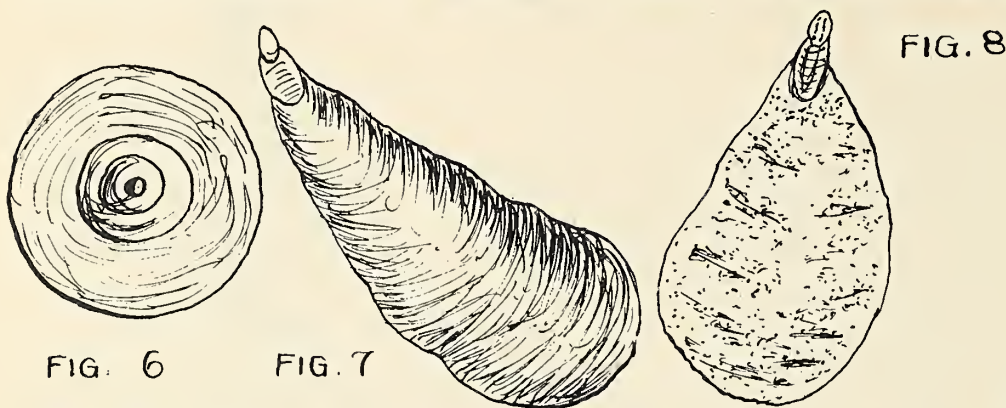


FIG. 5

Scale insects are best controlled by the application of miscible-oil

spray. This should be applied when the trees are dormant, after growth stops in the fall and before it begins in spring, but never when the temperature is below 45° Fahrenheit. *No species of maple can safely be sprayed with oil at*



any time. Woolly aphids on the latter should be sprayed with nicotine-soap solution. Other species may require hand-painting with undiluted spray-oil, because of their protective covering.

Woolly aphids are responsible for the wide-spread killing of American beech in the Northeastern States. Colonies of similar insects may be the vector for the virus disease of elms now so destructive in the Ohio River Valley.



Red spider on evergreens can best be controlled by the use of lime-sulphur, except where their proximity to houses may make the use of a high-pressure fine spray of plain water more judicious, in order to avoid discoloration of painted surfaces. Leaf hoppers and white-flies ordinarily respond to a nicotine-soap solution, if applied thoroughly to the under surface of the leaves.

Borers, with the possible exception of the bronze birch-borer, may ordinarily be controlled, either by excavation, injection, or the application of a toxic paste to their burrows. The birch-borer should respond to D.D.T. during the short feeding and oviposition period. The same should be true with respect to the serious onslaught of the locust leaf-miner. Even leaf hoppers, sawflies and twig-pruners may be amenable to such control if the measures are thorough.

Such destructive insects as bagworm and case-bearer are apparently not affected by D.D.T. It appears necessary to resort to the arsenicals in their case. Of course, hand-picking of bagworm is desirable if the plants are not too large, to avoid discoloration of the plants, but the job must be done thoroughly, which requires good eyesight and patience.

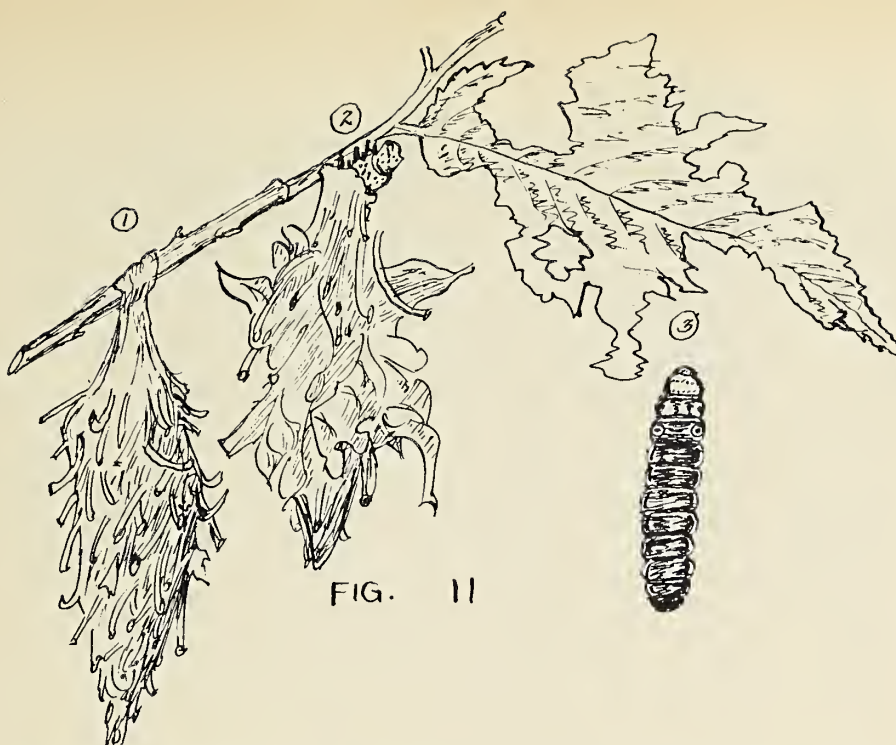


FIG. 11

1. ELM LEAF BEETLE, *Galerucella luteola* (1): adult $\times 4$, (2): larva $\times 4$.
2. WHITE MARKED TUSSOCK MOTH, *Hemerocampa leucostigma*, female natural size.
3. BOX-ELDER BUG, *Leptocoris trivittatus*, $\times 2$
4. FOREST TENT-CATERPILLAR, *Malacosoma disstria*, egg mass about natural size.
5. FALL WEB WORM, *Hyphantria textor*, (1) spotted form, (2) full-grown larva, (3) white form in resting position; all about natural size.
6. SAN JOSE SCALE, *Aspidiotus perniciosus*, female much enlarged.
7. OYSTER SCALE, *Lepidosaphes lmi*, female much enlarged.
8. SCURFY SCALE, *Chionaspis furfura*, female much enlarged.
9. COTTONY MAPLE SCALE, *Pulvinaria inramabilis*, (1) adult females on twig, (2) young scales on underside of leaf, both natural size.
10. BRONZE BIRCH-BORER, *Agrilus anxius*, $\times 6$.
11. BAG or BASKET WORM, *Thyridopteryx ephemeraeformis*, (1) winter stage, (2) full grown larva walking in case under construction, (3) full grown larva removed from case, natural size.

NOTE: Figs. 1,5,6,7,8,9,11 after Joutel (in E.P. Felt - New York State Museum Report); Figs. 4, 10 after Blackman and Ellis; Fig. 2 after Sanderson and Jackson; Fig. 3 after Kellogg.



FIG. 10

It is believed that the more troublesome insects now causing concern have been discussed to such an extent that their control can be appreciated, if not readily accomplished. It is hoped that this brief account will enable the novice to recognize some of his possible insect problems. It should be remembered that the important thing is to get control measures under way before the attack begins, if possible.

BOOK REVIEW

FLORA OF DELAWARE AND THE EASTERN SHORE by Robert R. Tatnall.
Published by the Society of Natural History of Delaware:
Wilmington: 1946: xxvi 313 pages, 10 plates, map. Price, \$3.50.

Biologically speaking, the best described portion of Maryland has long been the area around Washington. Our Eastern Shore, though recognized as a fruitful field for study, has been somewhat off the beaten track and neg-

lected. Some years ago our sister institution in Wilmington decided to take the whole of the Del-Mar-Va peninsula as its special field of study and in the present work we have an admirable result of that decision. The peninsula is a natural region which is as neatly delimited as any that could be found in the East, and so the perusal of this book gives an unusually satisfying picture which is lacking in the floras of more heterogeneous areas.

The subtitle, "An Annotated List of the Ferns and Flowering Plants of the Peninsula of Delaware, Maryland and Virginia", describes the work. Here are no keys, no descriptions; the book is simply a taxonomically ordered list of names with brief notes on manner of occurrence, distribution, and, in many cases, references to specific collections. The nomenclature is up-to-date but where names differ from those of the 7th edition of Gray's Manual, reference is usually given to the source of the name used. There are only a few cases where the remarks are extended, notably with the very rare box huckleberry (*Gaylussacia brachycera*). Equal attention is given to all portions of the peninsula and trips have been made to all the shore counties of the three states.

Though the body of the work will have meaning only to those somewhat acquainted with systematic botany, the introduction is worth the attention of all concerned with the biology of our general region. The photographic plates illustrate some of the more unusual plants. The book closes with a useful tabulation of the number of species and varieties by families, a bibliography on the botany of the peninsula, and an index. Finally, it should be said that the Flora is a book which has been splendidly produced, with excellent printing on strong paper and a sturdy buckram binding. Both author and publisher are to be warmly congratulated on a worthy enterprise well executed.

Haven Kolb

IN MEMORIAM

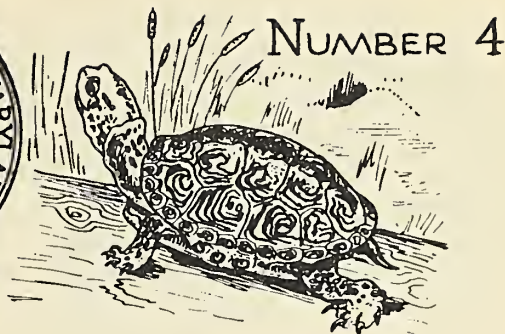
On February 15, 1948, the Society lost one of its best friends and members, Benjamin A. Calder.

Mr. Calder joined the Society in its first years and became associated with the Department of Paleontology, in the work of which he took a great delight. He not only accompanied the department on its many field trips and expeditions, but worked in the laboratory, on the preservation and restoration of the fossils collected.

Ben, as he was affectionately called, participated in most of the functions of the Society, until quite recent years, when his ill health kept him at home. Even then he followed closely the progress of the Society, looking forward to the coming of the next issue of our Journal.

His was a kindly nature, expressed by a genial smile at all times. His brother, John B. Calder, is Secretary of the Society and Assistant Curator of Paleontology.

E.B.F.



NUMBER 4

MARYLAND NATURE LEAFLET

MARYLAND FROGS AND TOADS

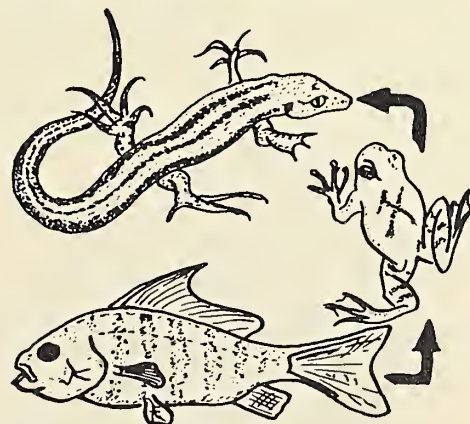
by
John E. Cooper



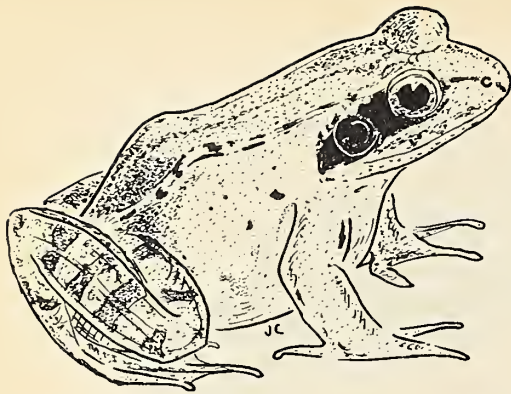
Maryland frogs and toads come from an ancient family. Fully 300,000,000 years ago, when the shallow seas which had flooded much of the continents of the earth began to dry up, certain fishes attempted to fit themselves to the new conditions. This change was a long, hard process and it resulted in the formation of a completely new type of animal - the amphibian, a creature able to live most of its life on land but still forced to return to the watery world of its ancestors for the first stages of its life. Today our Maryland frogs and toads together with the salamanders still follow the ways of those first amphibians.

Most amphibians absorb oxygen through their lungs, gills, and moist skin and, excepting in the cases of some of the toads, they cannot exist in a dry situation. All amphibians are cold-blooded; that is, their body temperature follows the changes in the temperature of their surroundings.

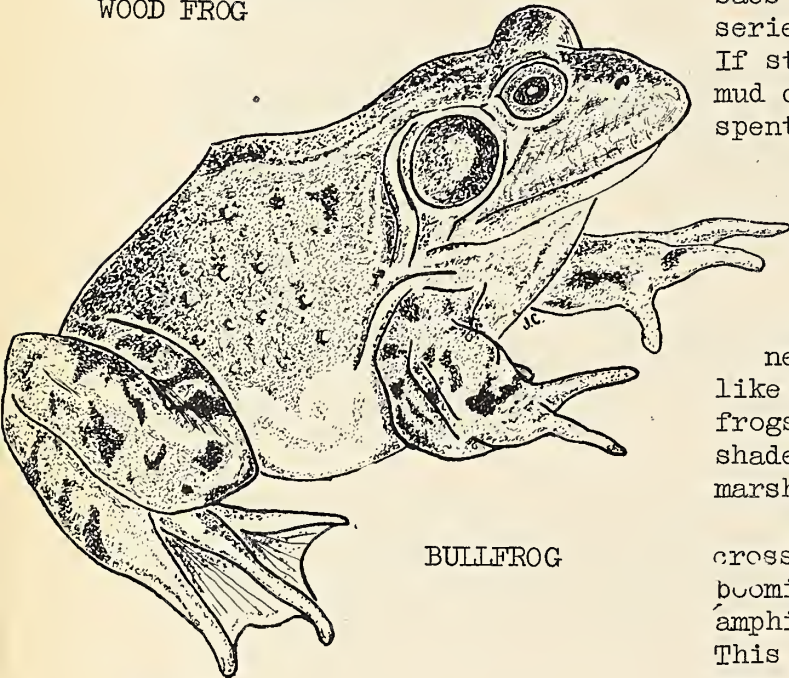
The amphibians are divided into two large groups: (1) the tailed amphibians, such as salamanders and newts, (see Nature Leaflet No. 2) and (2) the tailless amphibians, the frogs and toads. This leaflet describes the tailless amphibians to be found in Maryland, with the exception of the tree frogs. There are no poisonous frogs or toads in the United States, although some of



Amphibians are a link
between fishes and reptiles.



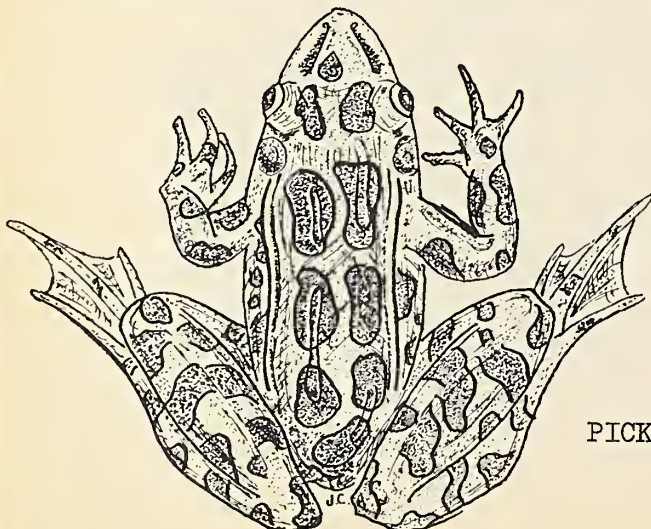
WOOD FROG



BULLFROG



GREEN FROG



PICKEREL FROG

these creatures secrete a substance on their backs which is disagreeable to enemies.

Early in March, though ice still borders the ponds and snow may cover the woodlands, the male wood frog, *Rana sylvatica sylvatica*, can often be heard clacking loudly for its mate. Floating sprawled on the water's surface, the ambitious suitor blows up the large sacs of skin beside the head and produces a series of calls similar to those made by ducks. If startled, the frog darts into the leaves and mud covering the pond bottom, where it has spent the cold winter. The color of this frog changes with the weather. When cold, the wood frog may appear nearly uniform black, but in the warmth of late spring and summer it will take on a characteristic tan-pink hue and its black face mask, a distinguishing feature, will become prominent. This delicate appearing creature, unlike the majority of Maryland *Ranidae* or true frogs, seeks the cool inner recesses of the shaded wood instead of stream banks, ponds, or marshes.

"Jug-O-Rum!. Jug-O-Rum! Jug-O-Rum!" Across the marshes and lakes echoes the loud, booming voice of one of Maryland's largest amphibians, the bullfrog, *Rana catesbeiana*. This mammoth of the frog world is relished by many people and hence is sought after by restaurateurs the world over because of the product which it so unwillingly yields - "frog-legs." Some states have established game laws and bag limits governing the catching of this big frog. Naturalists, collecting the bullfrog in the field, have often been surprised to hear freshly caught specimens, mouth opened wide, emit a pitifully agonized scream not unlike the high-pitched crying of a young child. This outburst is attributed to fear or pain. The bullfrog, like our other native frogs, is a meat-eater (carnivore) and feeds mainly on insects, spiders, and crustaceans, but has even been known to devour snakes and small mammals. It is cannibalistic and will eat other frogs of its kind.

Smaller than the preceding species, but like it in habits, feeding, and color, the green frog, *Rana clamitans*, may be found on the edges of ponds and lakes throughout the entire state. When approached, it jumps into the water sounding a high "gleep" or the familiar

mating song which is best described as a single, low, metallic "gung." The sound can be imitated by "plucking a slightly loose mandolin string." The green frog may be distinguished from the bullfrog by the presence of two dorso-lateral folds along its back, a feature which the latter lacks (see diagram). The male can be identified by the size of its tympanum which is nearly twice the diameter of the eye, whereas the female's tympanum is about the same size as the eye.

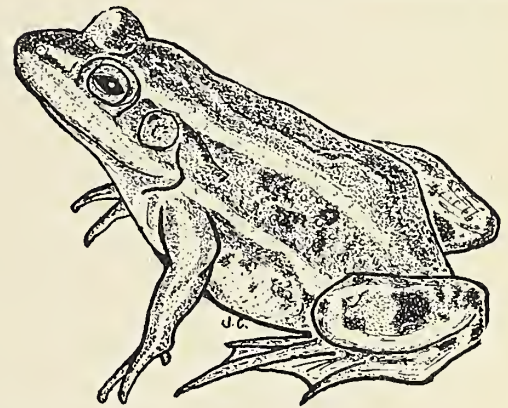
One of our most abundant Maryland frogs is the pickerel frog, *Rana palustris*, a species which closely resembles its near relative, the leopard frog. However, the latter has roundish dorsal markings and the dominant color is green, whereas, the pickerel frog has rectangular markings which are more uniformly arranged, and the dominant color is brown. This handsome amphibian is seldom preyed on by other animals because it gives off a distasteful skin-gland secretion which irritates and burns the tender mouth tissues. The pickerel frog is found practically any place where there is a stream or puddle, and in the course of its life it seldom wanders far from the water. It is used as bait for pickerel fishing, hence the common name.

The leopard frog, *Rana pipiens*, gets its name from the dark, irregular spots on the upper surface, spots resembling those of its namesake, the leopard. This frog's metallic-yellow dorso-lateral folds are very prominent and give additional contrast to the green, white, and brown colors of its body. The leopard frog is well known to biology students because it is used a great deal in introductory classes in anatomy. The color and pattern variations of Southern Maryland specimens are very extreme. This frog usually restricts its activities to grassy meadows but sometimes makes long journeys overland and, during high temperatures of summer, is often found on hillsides in logs or under stones where it is hiding to escape the heat. Its voice is a guttural, grunting croak, rather low-pitched and not very loud.

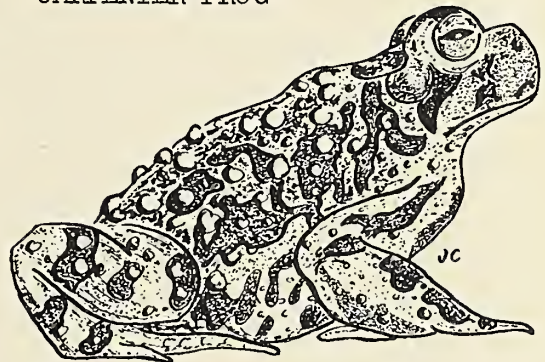
One of the strangest of mating calls belongs to a small amphibian known as the carpenter frog, *Rana virgatipes*. This creature produces a song which resembles the pounding of a hammer, and a whole group of them serenading vigorously sounds like carpenters at work, hence the common name. This rare frog was just discovered in Maryland in



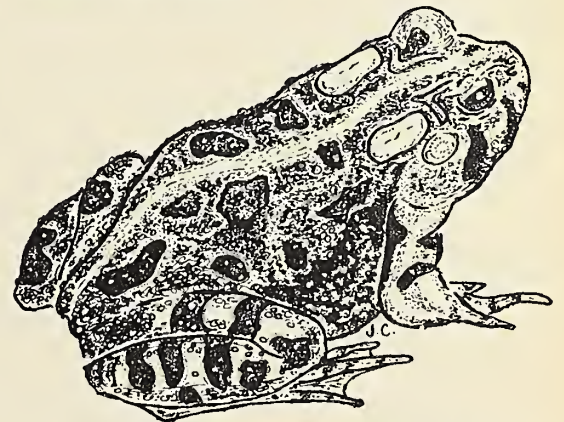
LEOPARD FROG



CARPENTER FROG

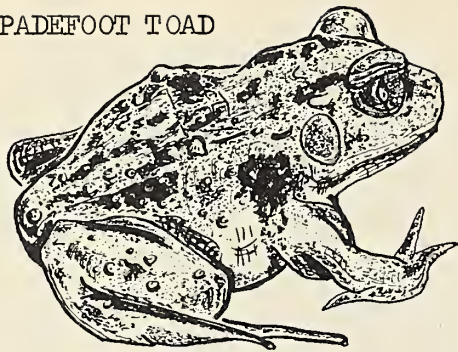


AMERICAN TOAD



FOWLER'S TOAD

SPADEFOOT TOAD



Frog
(egg mass)

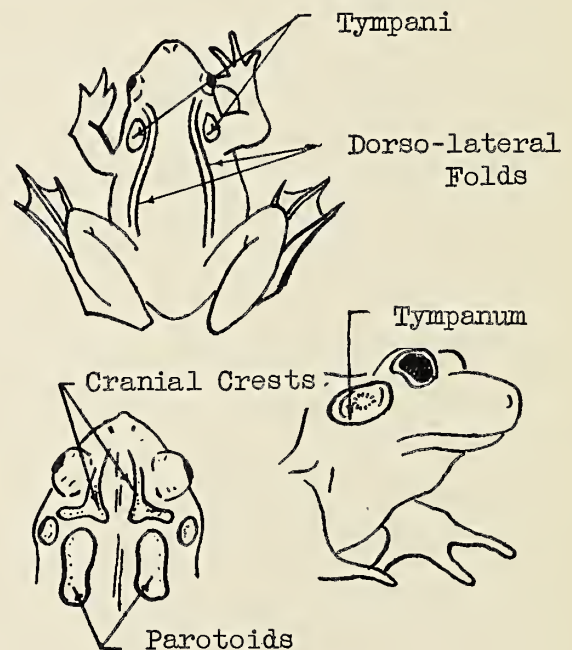


Toad
(egg string)

August, 1947, and exists only, so far as it known, in certain bogs of the Eastern Shore. There are no dorso-lateral folds present, but running backward along each side are two golden stripes, one from the eye and one from the corner of the mouth.

Perhaps the best known of Maryland amphibians are the toads with their broad, heavy bodies, short, stout legs, and rough, warty skins. Contrary to popular belief toads cannot cause warts, but, from the large, kidney-shaped parotoid glands behind the eyes (see diagram) comes a milky fluid used in defense. Unlike frogs, toads lay their eggs in pearly strings which contain as many as six thousand small, black dots. Through the ages, poets have never ceased to marvel that such a rough, stupid-looking creature as the toad, " . . . ugly and venomous, Wears yet a precious jewel in his head." The "precious jewel" is the creature's eye, gold in coloration with flecks of black and silver. A prominent bony ridge, the cranial crest, is found behind each eye.

During the day, the American toad, *Bufo terrestris americanus*, hides under boards and stones or burrows beneath the earth, but at night it comes forth to hunt insects, spiders, and other such creatures. This toad is most abundant in the mountain and plateau regions of our state, but a few specimens have been found on the flat Coastal Plain. Its voice is a soft, sweet, trill as contrasted with the goat or sheep-like bleat of the Fowler's toad, *Bufo woodhousii fowleri*. The American toad may also be distinguished by its heavily black-spotted belly, large warts on the upper leg surface, relatively shorter legs, and only one or two large warts in each dorsal mark. The Fowler's toad is common in the sandy regions of our Coastal Plain where it may be found during the day in large numbers hiding under cover. Its tongue, like the tongues of Maryland's other frogs and toads, is attached at the front of the mouth and can be shot out to capture tasty morsels.



While gardening in Southern Maryland or on the Eastern Shore, you may happen to dig up a small toad with comparatively smooth skin and bulging eyes having vertical pupils. This is the spadefoot toad, *Scaphiopus holbrookii holbrookii*, which derives its name from the black, spadelike growth on each of the hind feet. Unlike the other toads, it has no cranial crests and the parotoids are small and round. The spadefoot digs backward into the ground sometimes going to a depth of six or seven feet and only appears when heavy summer rains call it forth to mate. At such times the roads are covered with these toads, whose mating calls resemble the braying of mules.

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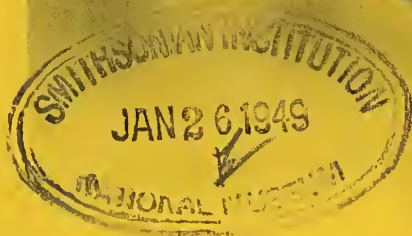
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MARYLAND NATURALIST

The Natural History Society of Maryland

SUMMER 1948

VOLUME XVIII No. 3



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MARYLAND NATURALIST



PART OF SKELETON OF SULPHUR BOTTOM WHALE FROM CHESAPEAKE BAY
(See pages 43 and 44)



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EDITORIAL

Invitation to Nature

Each day many of us promise ourselves that we shall devote more time to the great natural world about us. Often our interests were first awakened in teen years or before, but then with the World unrest and strife, and from another point of view, with the years of preparation necessary to achieve even a bare foothold in our business or profession, and the struggle of daily living, we have found that as yet the time has never arrived. We hope to learn more about the birds whose songs awaken us in the morning, more about the trees and flowers, many so commonplace, taken for granted, but unknown by names or characteristics. Or perhaps our interests lie in other fields of nature - with minerals or their picturesque crystals, often called the "flowers of minerals", or fossils - relics of ten or one hundred million years ago - a fascinating study. Or marine life, or insects, or some other phase of natural history. Some day we hope to have the time.

If we could only take some time for such interests as we go along, lest the time we hope for never come.

For Maryland is very rich in all branches of nature. A trip to Loch Raven will reveal abundant mammal and bird life; a ride or hike to Bare Hills or any of the quarries in and near Baltimore will yield to the collector many different types of rocks and minerals; while a journey to Calvert Cliffs, and a little digging will unearth in abundance fossils of the Miocene period. It would not be at all difficult to name many nearby collecting areas and places suitable for natural history observation. In many cases, our own backyards are veritable miniature worlds of nature, awaiting our observation and study.

It is helpful to have contacts with others who are also interested in natural history. This stimulates interest and aids in the identification of specimens collected and observed. The purpose of the Natural History Society of Maryland is to interest Marylanders in the wealth of our natural history and the conservation of our heritage. The Society welcomes the opportunity to make the people of Baltimore and of Maryland natural history conscious. Our State is ideally located, with a very diversified fauna and flora. Touching our shores is the Atlantic Ocean, and within our borders is the greater part of the unique Chesapeake Bay. Our land mass, rising in a westerly direction from the Coastal Plain, passes through the Piedmont Plateau and the Appalachian Highland (in Maryland, parts of the Blue Ridge Mountains and the Allegheny Mountains). The Natural History Society invites you to explore Maryland's natureland. Now!

H.C.M.

AN ACCOUNT OF A WHALE SKELETON

by

E. A. ANDREWS AND R. P. COWLES

In his great old age, John Widgeon, the caretaker of the Maryland Academy of Sciences, related that one summer (about 1876) P. R. Uhler, President of the Academy, who was up in the Blue Ridge Mountains, telegraphed him to go down to Crisfield to buy and prepare a whale that had gone ashore in six feet of water. He bought the whale for eighty dollars just in time to keep it out of the hands of representatives of the Philadelphia Academy of Sciences who came for the same purpose. The purchase by the Maryland Academy of Sciences was suggested by Dr. Russell Murdoch and the money needed was a gift from Mr. William H. Graham.

Widgeon cut the bones out of the body and buried them in the sand till later when he could bring them to Baltimore, where he finished the cleaning in the back yard of the Academy much to the disgust of the neighbors.

The skeleton, partly mounted, was displayed in the museum of the Maryland Academy of Sciences but when Cathedral Street was cut through the building of the Academy had to be demolished and then the Academy, according to a letter and memo from President Daniel Coit Gilman of the Johns Hopkins University to Dr. Murdoch, gave the whale skeleton and much other valuable material, including a fine collection of Maryland fish and reptiles, to the Johns Hopkins University. When the skeleton, that of a female whale about half grown but lacking sternum, bones of the front limbs, and pelvis, arrived at the old Biological Laboratory of Hopkins, the skull had been well mounted with iron pipes and the vertebrae pierced by holes and the epiphyses well fastened to the centra, but all the vertebrae were loose and separated. The vertebrae were stored in the museum for demonstration specimens, but the skull was hung out in the hall so that it could be lowered by ropes and pulleys. Then every year the skull was lowered and studied in detail by members of the class in comparative osteology, with profit, as the open sutures of this young specimen made homologies easy to comprehend.

When the moving of the University to Homewood took place the whale bones were placed in a basement room of Gilman Hall, intended for the library but used as a museum. Ultimately (1923-1924) the whole skeleton was mounted from brackets by the labors of Yasushi Ibara, graduate student in Biology, who also made a careful descriptive label, printed by hand, with an ink sketch of a living whale, which label was photographed for "An Account of the Biological Department", as yet unprinted (1947).

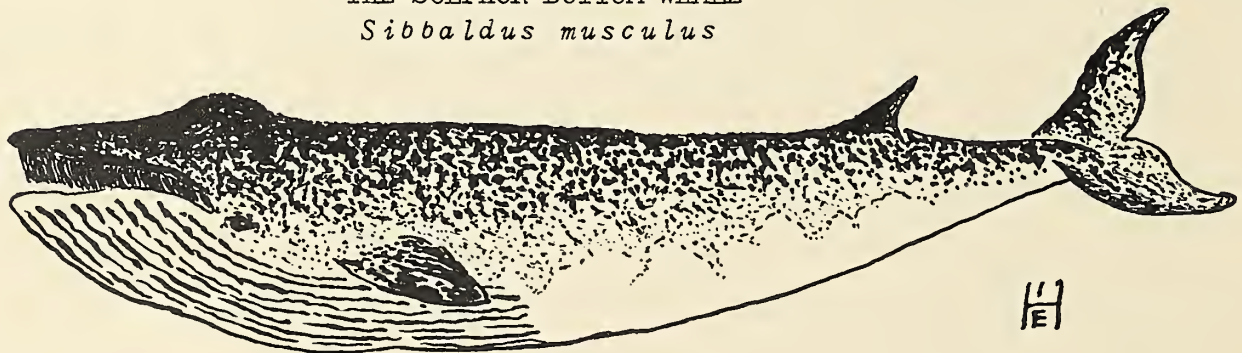
After being thus mounted the whale skeleton was studied by Dr. Miller, the well-known investigator of whale skulls from the National Museum, and was identified as a very young, perhaps three years old, specimen of the Blue Whale or Sulphur Bottom Whale (*Sibbaldus musculus*). He thought the specimen unique and worthy of monographic description as showing unknown characters of cranial bones later fused together.

When Mergenthaler Hall, the new Biological Laboratory at Homewood, was built there was no adequate space for a whale skeleton and the library needing the space occupied by it in Gilman Hall, the Board of Trustees of Johns Hopkins University authorized Dr. B. H. Willier, Director of the Biological Laboratories at Homewood, to give the whale skeleton to the Natural History Society of Maryland.

Accordingly it was taken by them as a gift during the latter part of 1947 and Dr. Willier wrote in a letter to Mr. Edmund B. Fladung, President of the Natural History Society of Maryland, "I will be glad to learn that this rare specimen may be of use to you in promoting interest among the people of Baltimore in Natural History".

(Ed. Note. This specimen is being prepared for exhibition by F. Milton Oler, Jr., Curator of our Museum, and his Staff.)

THE SULPHUR BOTTOM WHALE
Sibbaldus musculus



The Sulphur Bottom Whale, the largest of all whales, has an average length of 60-80 feet, and has been known to reach a length of 103 feet. A 95 foot specimen was estimated to weigh 147 tons. The young may weigh as much as 8 tons at birth and reach a length of 24 feet.

The head is long; baleen short, bluish-black in color; dorsal fin small and curved; pectoral fin small; small longitudinal furrows on the throat. The body is comparatively slender. The sulphur bottom is slate gray to mottled bluish-gray above, underparts varying from white to yellowish or gray marked with irregular white areas. A film of diatoms may cover the skin, making the belly look brownish-yellow, which gave this species the name of sulphur bottom.

This whale is a world traveler, appearing on both coasts. It haunts the polar ice edge in search of tiny sea animals, which are scooped up as the sea water strains through the baleen.

The name *Sibbaldus* is derived from that of the Scottish scientist, Robert Sibbald.

Irving E. Hampe

SOME MONSTROSITIES AMONG FISH.

by

D. R. CRAWFORD.

Everyone is interested in the abnormal. The two-headed snake, the three- or four-legged chicken, the two-headed calf, the human Siamese twins -- all are good for a newspaper article or a crowd at the side show. Yet most people do not realize that monstrosities similar to those just mentioned, all of which belong to the same type, occur quite commonly among fish.

The study of monstrosities is known as *teratology* which includes abnormalities of all kinds. For convenience monstrosities are classified according to their nature. The largest number and variety of monsters among fish are of the type in which the body is partially or wholly divided, resulting in two or three-headed fish. These are known as *Didymi* and are classified as follows:-

DIDYMI.

- I. *Anadidymi* - Division in the forepart of the body which may involve only the forebrain, or extend to the vent. (Fig. 1a).
- II. *Katadidymi* - Division in the posterior region resulting in two tails. Known only from varieties of goldfish.
- III. *Anakatadidymi* - Division entire, resulting in two completely separated bodies on the same egg yolk. (Fig. 2).

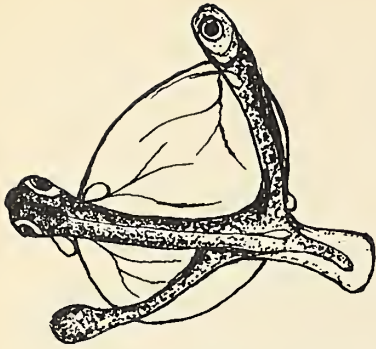
Sometimes a fourth division, the *mesodidymi*, is made, in which there is no external evidence of their nature, the only indication being duplication of some of the internal organs. Thus, there may be two hearts or the dorsal aorta may branch.

Records of the various types of double monster are common, especially among the *Salmonidae*. This is not surprising since species of trouts and charrs and salmon have been artificially propagated on a large scale for a long time and many millions of eggs have been observed in all stages of development. As an indication of the wide distribution of observations it is mentioned that the accompanying drawings were made from preserved specimens found in hatchery collections scattered from the Pacific to the Atlantic Coast.

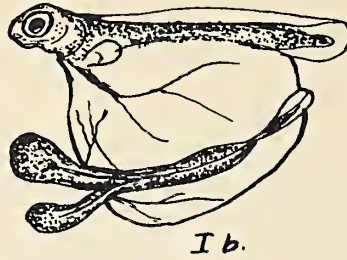
Most of these monsters die at an early age, some not even hatching, while others live until the yolk sac is absorbed, and a few are known which reached a length of several inches. The *mesodidymi* indicate that some types of double monster may reach adult size by the process of one twin which had a complete body absorbing the other which was incomplete.

Among the *anadidymi* are specimens with three or four eyes, and probably also the cyclops which has one very large, centrally located eye. (Fig. 1c). These monsters are of the type in which division occurred in the fore part of the head which appears much broader than normal and with the various parts greatly dis-

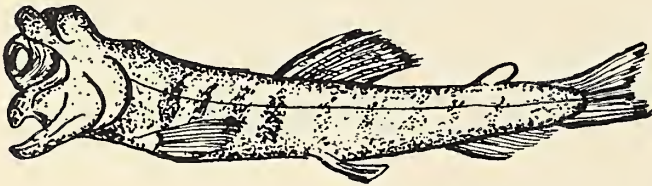
Fig. I. ANADIDYMI



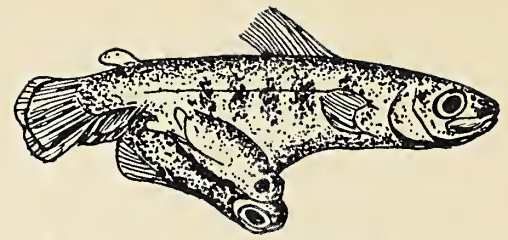
Ia. Triple monster Brook trout. 8X.



Ib.



Ic. Cyclops. Rainbow trout.
Salmo shasta. 3X.



Id. Advanced Triple
Monster. *S. shasta* 2X.

finally the cyclops which has a single eye with one lens and no dividing septum through the eye ball. All of the cyclopic forms observed by the writer were abnormally light in color, some specimens being entirely white. In spite of the great distortion of the head, the cyclops is capable of reaching an advanced stage of development, although the individuals remain much smaller in size than normal fish of the same age. They are fully as active as normally developed fish and have no difficulty in securing their food. However, none, so far as known to the writer, has been observed which reached large size or sexual maturity. It is probable that because of their conspicuously light color and small size they become the prey of larger fish.

Triple monsters are very rare among fish. The writer recorded six* and only a few had been recorded previously. All specimens known were of the anadidymous type, although one was partially anakatadidymous, one of the twins having two imperfect heads. (Fig. 1b).

The third body usually is imperfect, sometimes being reduced to an eyeless head from which a cord-like structure containing the nerve chord and dorsal blood vessel extends posteriorly. Only two specimens of triple monster are known which had reached an advanced stage of development. One of these is shown in Fig. 1d. Externally, the body appeared unusually deep and the dorsal fins of the two imperfect bodies extended downward making it appear that the anal fin was triplicated, which however, was not the case. The caudal fin was doubled. The collectors of these specimens told the writer that these monsters had been active feeders and that they might have been able to continue their development.

No large two-or three-headed fish have been observed. If such a monster lived to an advanced stage of development it seems probable that the one perfect body would absorb the imperfect parts and the fish continue its existence as a mesodidymous type with nothing very unusual in its external appearance. Many specimens of twin fish have been observed where there were two complete bodies

*Some Records of Triple Monsters among the Salmonid Fishes, *Copeia* No. 130, pp. 49-50, 1921.

on the same egg yolk. The bodies are usually parallel with both heads pointing in the same direction. The fish swim on their sides and are quite active. As far as known none reach large size since they rarely survive beyond absorption of the egg yolk. These are the anakatadidymi. Specimens are known where one of the bodies is incomplete, in which case the complete body will absorb the other along with the egg yolk and survive to maturity as a single fish. It is possible that some of the mesodidymi may develop from this type.

Some very curious monsters are the result of malformations of the head. Several adult salmon have been shown to the writer in which the fore part of the head curved abruptly downward in front of the eyes leaving the lower jaw protruding like a beak. Dissection showed that none of the bones was missing, but that all of the bones comprised in the front of the head had been foreshortened, and that this did not seem to be caused by injury. Specimens have been seen in which the lower jaw was foreshortened, thus causing the top of the head to protrude beyond the mouth, somewhat like a shark's head.

Hump-backed and "bunt-tailed" fishes result when the vertebrae grow together thus causing the spinal column to be greatly foreshortened. This is known as *synostosis* and may occur in the caudal region (Fig. 3), or in the anterior parts. Such monsters may reach a state of sexual maturity and live on as adults for a number of years.

We know comparatively little about the causes of monstrosities. Definite answers must wait on the results of experimental work still to be done. It is pointed out that such work is extremely difficult since it involves a study of very early stages of development which occur in the first few hours after fertilization of the egg. We know that the pattern of development is determined long before the eggs hatch, because experimentally induced changes in the environment cause changes in the developing embryo only during the early cell divisions of the germinal disc. After differentiation of the tissues has occurred changes in external conditions result usually in death, or changes in rate of growth rather than in modifications of structure.

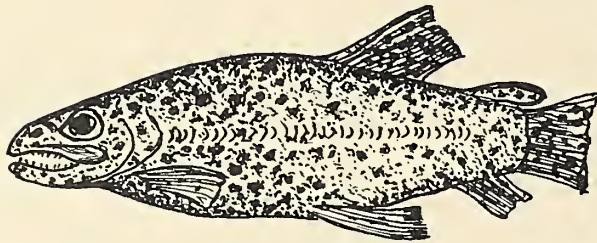
There is definite evidence that unusually large numbers of double monsters are found among trout eggs which have been roughly handled soon after fertilization. This suggests that the germinal disc can be broken apart and that each part may develop a more or less complete embryo. On this basis, the two-headed, single-tailed fish are explained by the parts of the germinal disc being separated by less than 180 degrees, the twins eventually being fused in the course of development. The anakatadidymous twins develop from germinal areas separated

Fig. II.



Anakatadidymus
Silver salmon. 4X.
Oncorhynchus kisutch.

Fig. III. SYNOSTOSIS

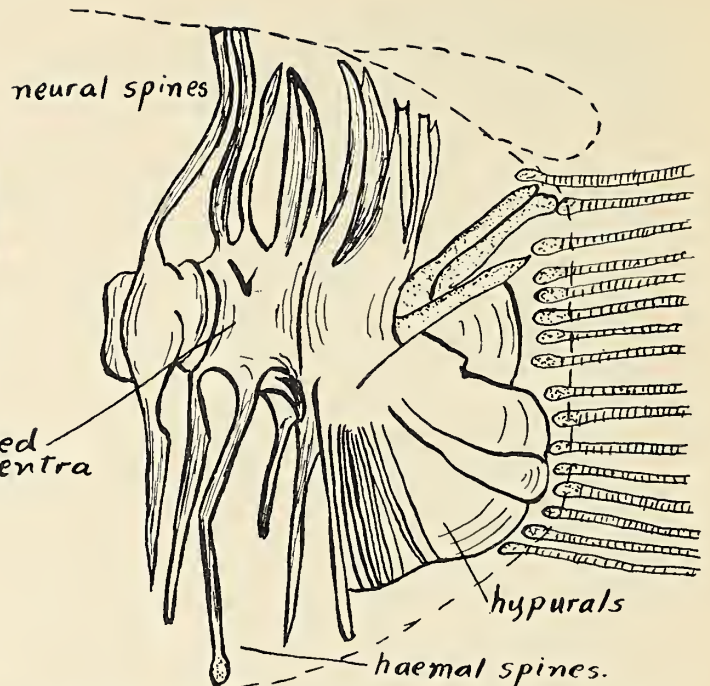


III a. Adult Rainbow Trout. $\frac{1}{3} \times$.

Fig. IV



Deformity of trout induced experimentally.



III b. Enlargement of Caudal Region. Showing Synostosis.

by 180 degrees, i. e., on opposite sides of the egg yolk. It thus is apparent that it is improbable that perfectly anakatadidymous triple monsters ever will be found since the maximum separation of the geminal areas would be 120 degrees which is within the range where fusion of the bodies could occur.

Embryologists have observed that there is a rhythm in the development of the different structures and that if anything occurs to upset this orderly sequence abnormalities will result. Thus, when developing trout eggs were held at low temperatures so that hatching was greatly delayed a large number of hump-backed young resulted. Also, when trout eggs were kept at high temperatures, large numbers of deformed young were hatched.

Various types of malformations are induced under experimental conditions. Probably these should not be classed as true monstrosities since there is no suppression or modification of structures resulting from embryonic development. It has been observed during experiments in which young trout were forced to swim constantly against a strong current that there would be some which developed a distortion in the caudal region. (Fig. 4). This is a result of overdevelopment of the muscles, without a corresponding development of the skeleton which is pulled out of normal position by the enlarged muscles acting on it. This distortion may be in a vertical plane as shown in Figure 4, or it may be in a horizontal plane.

It was mentioned at the beginning of this article that the only known katadidymi were some of the fancy breeds of goldfish which have double tails. It is known that in most of the double-tailed varieties only the caudal fin is involved, but it has been observed in some that there is a true doubling of the

hypurals and even the extreme posterior of the spinal column is sometimes doubled. It is interesting to note that this trait is hereditary. In this connection, it is noted that eggs taken from trout showing well-developed synostosis of the spinal column yielded normally developed young which seems to indicate that this type of monstrosity is not hereditary.

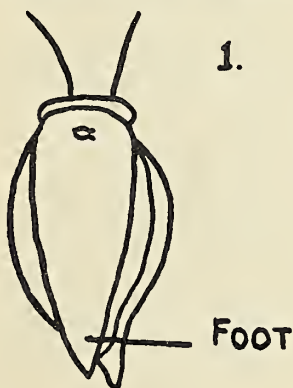
A TWO-FOOTED SNAIL

by

ELIAS COHEN

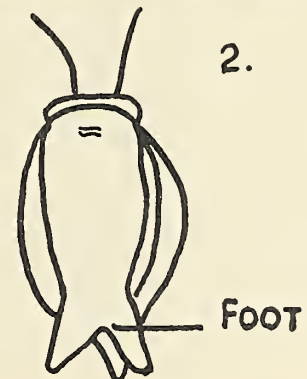
"Two-footed snail! Do snails have feet?". This is the average reaction to the writer's statement of his find. Yet, such a snail was collected on March 10, 1935, from a pond in Herring Run Park, Baltimore, Maryland. It was identified as *Physa gyrina* Say, a common species of pond snail. This specimen, instead of possessing a single well-developed ventral foot on which to creep, (Fig. 1), had a forked one (Fig. 2). Most of the gastropods that the writer knew anything about were one-footed, particularly this species of *Physa*. An investigation of the literature revealed that some gastropod relatives of the pond snail, the Sea Hares (*Aplysia*), of Florida and the West Indies, normally grow a pair of lateral lobes from their foot which act as fins; however, the rest of the gastropods (snails, slugs, limpets, periwinkles, and whelks) have a single foot, with only a few modifications here and there.

The fact that the Herring Run specimen was an anomaly, was substantiated later on March 15, 1935, when the snail laid a cluster of 10 eggs, all of which developed into normal one-footed gastropods. As to how the "freak" was formed, the writer can not say. Dr. Joseph P. E. Morrison, Division of Mollusks, National Museum, and Dr. Willis L. Tressler, formerly of the University of Maryland, in 1941 mentioned to the writer that they never had observed such a specimen, but stated that some upset in embryonic development may have been responsible. The only person



1.

that the writer has met that claimed to have ever seen or collected such snails, is William K. Bartlett, of Trappe, Talbot County, Maryland. He believes that he saw two-footed pond snails in a small spring, but his lack of certainty leads the writer to believe that the Herring Run specimen is the first one to make history.



2.

DRAWINGS FROM THE VENTRAL SIDE. 1. NORMAL SPECIMEN. 2. ABNORMAL HERRING RUN SPECIMEN
(Enlarged about 5X)

NOTES FROM FIELD AND LABORATORY

SOURCES OF MAMMALIAN STUDY MATERIAL

The embryo naturalist seeking data on the mammals of his locality usually relies on the trap line and firearms to procure specimens. The most common forms are soon taken, with an occasional capture of the smallest and rarer species added after extensive field work. The smaller forms may not be as rare as circumstances indicate, due to the difficulty in trapping them. Their occurrence in numbers may be indicated by the study of the ejected pellets of our common owls.

Owl pellets, the regurgitated mass of indigestible matter found under the roosts and nests, are often a better criterion than the trap line for estimating the abundance of the rarer mammals. Complete skulls are often found in these pellets along with bits of fur and other skeletal material. An added advantage is that the skulls are nearly always cleaned of flesh and require little additional scraping to make good cabinet specimens.

The nests of hawks and owls kept under close observation are good indicators of mammal abundance. If the nests are situated so as to be reached safely, an examination at frequent intervals after the young have hatched, should provide good material. The young predatory birds frequently have more food than they can eat at one time and mammals, as well as other prey, are left lying on the nest.

The dens of the larger predatory mammals, such as the fox, raccoon, and the mink occasionally have remains of smaller mammals lying about the entrances, especially if the den contains young. During the trapping season a visit to a professional trapper can add to our knowledge of the fur bearing forms. The trapper usually disposes of the carcasses of his catch and if contacted will often save the skulls. Whenever possible the examination of fresh carcasses should be made to study stomach contents, extent of parasitism, probable gestation, and other data. Trappers, too, have a knowledge of the habits and abundance of mammals that should be recorded for future reference.

Hunters should not be overlooked in our search for information. Bag counts, skulls, and occasional complete specimens may be had by cultivating good relations with sportsmen.

Irving E. Hampe

ROBIN AND BAT

While bats may figure to some extent in the diet of owls they probably have few contacts with other birds. Most of the common diurnal birds go to roost rather early and few are active when bats ordinarily begin to appear in the twilight of summer evenings. However, on the evening of July 18, 1943, the writer witnessed a brief encounter between a robin (*Turdus migratorius*) and a small bat (*Myotis?*) in a suburban section of Baltimore, Maryland, the only in-

stance in a long experience with birds.

A long period of hot July weather had been temporarily relieved by rains and the freshness of the evening air perhaps encouraged the robins to remain active somewhat longer than usual. A small bat was an accustomed visitor to the locality in question, ranging about a corner street light and above adjacent lawns, but on the evening of July 18 it had not yet been noted when the writer was watching the robins. The birds were gradually disappearing as the dusk deepened, when one bird flew from an oak on the far side of the street toward a grove behind the observer's house. Just as it was halfway across, the small bat appeared from an undetermined direction and dove directly at the bird. It is doubtful whether there was any contact but the robin reacted violently, uttering several wild cries of obvious alarm, and tumbling over in mid-air. Abandoning its course, the bird landed on a telephone wire and for several minutes perched there with ruffled plumage and raised crown feathers evidently quite upset. The bat disappeared but was later seen as usual around the street-light.

Whether the "attack" by the bat was intentional or merely the chance result of a dive after an insect is, of course, not determinable. Perhaps the latter explanation is the more likely one and it has the advantage of avoiding the further questions as to motive which the former explanation would raise.

Haven Kolb

EXTENSION OF THE RANGE OF THE EASTERN GROUND SNAKE

As the result of the discovery of a moderate-sized adult eastern ground snake, *Haldea valeriae valeriae* (NHSM-R1065), D.O.R. (Dead On Road) at Swallow Falls State Park, Garrett County, the range for the species in Maryland experiences a straightline extension of approximately 100 miles and an extension from the Piedmont Plateau to the Appalachian Province. Previously, the westernmost point reached by the species in this state was Great Falls, Montgomery County. The specimen responsible for this range extension was found dead on a secondary dirt road in the Swallow Falls State Park on August 31, 1947 by Alfred Freyman and the writer. It was smashed and dehydrated almost beyond recognition, and had been dead for three or four days.

Other reptiles and amphibians observed and collected in the area were smooth green snake (*Opheodrys v. vernalis*), common milk snake (*Lampropeltis t. triangulum*), black racer (*Coluber c. constrictor*), ring-necked snake (*Diadophis punctatus edwardsii*), pilot black snake (*Elaphe obsoleta*), common water snake (*Natrix s. sipedon*), common garter snake (*Thamnophis s. sirtalis*), common box turtle (*Terrapene c. carolina*), American toad (*Bufo terrestris americanus*), eastern wood frog (*Rana s. sylvatica*), Allegheny salamander (*Desmognathus o. ochrophaeus*), seal salamander (*Desmognathus m. monticola*), slimy salamander (*Plethodon g. glutinosus*), newt (*Triturus v. viridescens*), and two-lined salamander (*Eurycea b. bislineata*).

In addition to this extension into the Appalachian Province, an area where the species was expected since McCauley (1945, Reptiles of Maryland and District of Columbia, p.120) records specimens from the same area in West Virginia, the individual from Swallow Falls represents the initial record from the Allegheny Plateau region of Maryland.

Intergradation with the western ground snake (*Haldea v. elegans*) was suspected when the scale formula was noted as being 15 - 17 - 17 - 17. However, Mr. Roger Conant, curator of the Philadelphia Zoological Gardens, informs the writer that Mr. M. Graham Netting, curator of herpetology in the Carnegie Museum, has specimens of *valeriae* from the mountains of Pennsylvania with very high scale counts. Nevertheless, since *elegans* does occur in western Pennsylvania (Perkins, 1940, Key to Snakes of United States, p.34) it should be diligently searched for in the mountainous western sections of Maryland.

John E. Cooper

SOME OBSERVATIONS ON THE FEEDING HABITS OF THE ELECTRIC LIGHT BUG (*Belostoma flumineum*)

In the early fall of 1947 I collected a mature electric light bug, *Belostoma flumineum*, (not the giant water bug, *Lethocerus americanus*) from Herring Run just below the sewage treatment plant at Herring Run Park, Baltimore. It lay under a leaf which was just free from the shore line and on the outside curve of the stream.

The specimen was brought to the laboratory and placed in an uncovered jar containing one quart of water, with a short stick projecting above the surface. The water was changed at irregular intervals of from one to four or five weeks.

Feeding was not a problem. The principal food was live snails of the genus *Physa*. The snails were taken when dropped into the jar, or when they were at rest. The insect seized a snail with its forelegs and then drew it back against the second pair of legs which were used to assist in holding it. The beak was thrust forward and projected into the aperture of the snail.

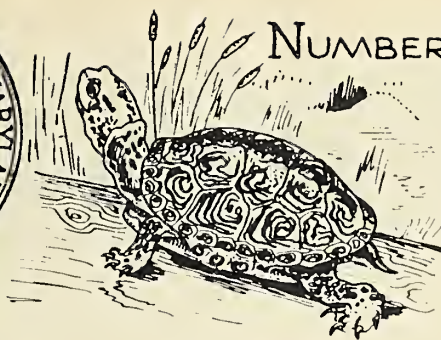
It required more than ten hours for the insect to complete feeding on a snail. The exact length of time was not determined because of conditions prohibiting further observations. *Anacharis*, an aquatic plant, gathered from Herring Run was also fed to the insect, but generally it was ignored as food. Occasionally the insect would thrust its beak into an *Anacharis* stem.

The insect tended to be more active at night. It fed on snails at any-time however, whenever they were dropped into the jar.

During the day it usually clung to the stick, its posterior end to the surface of the water. This proved to be a characteristic attitude. It would sometimes leave its position to capture a live snail which was dropped into the water in such a way as to fall in front of the insect. This nearly always caused the insect to attack the snail. At night it would leave its position and swim around with great alacrity. It searched for live snails and seized them voraciously after discovering them. Then it would return to its usual position on the stick to begin its feeding upon the snail. The posterior end of the insect was always up, but frequently did not reach the surface of the water.

The last forty-eight hours of life were characterized by no feeding. The posterior end was always up but never to the surface of the water. Swimming was discontinued except when the insect was greatly prodded. It never left the water during its ten months in the jar, although it could have done so since there was no cover over the jar.

Donald R. Crawford, Jr.



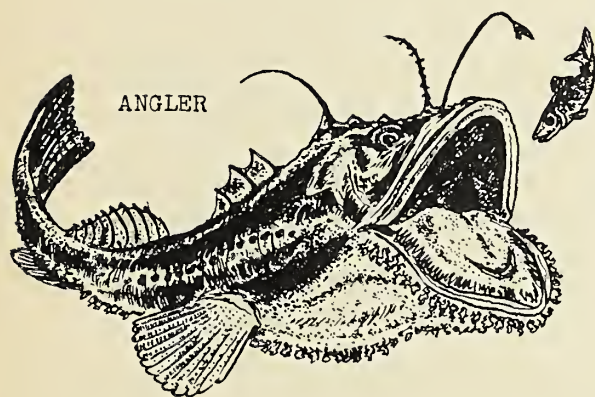
NUMBER 5

MARYLAND NATURE LEAFLET

QUEER FISH OF THE CHESAPEAKE

by

FRANK YINGLING



ANGLER

Since ancient days sailors have brought home tales of sea serpents and mermaids that have lured ships to their doom. Even in modern times articles about strange giant beasts being sighted at sea have often appeared, but these tales usually are far from clear and always lack photographs. Yet these creatures sighted on the world's oceans are not always entirely imaginary. Most are based on sea animals which are well-known to scientists, but which are often enlarged and distorted by the distances and odd and shifting lights and shadows of the rolling waves. Many fishes from the great depths of the ocean have a really grotesque appearance, with their strangely

shaped bodies and parts which light up like a fire-fly. Then there are aquatic mammals, such as whales and porpoises, which often give rise to such stories. A school of porpoises rolling through the waves appears like the coils of a single great snake and so another sea serpent tale begins.

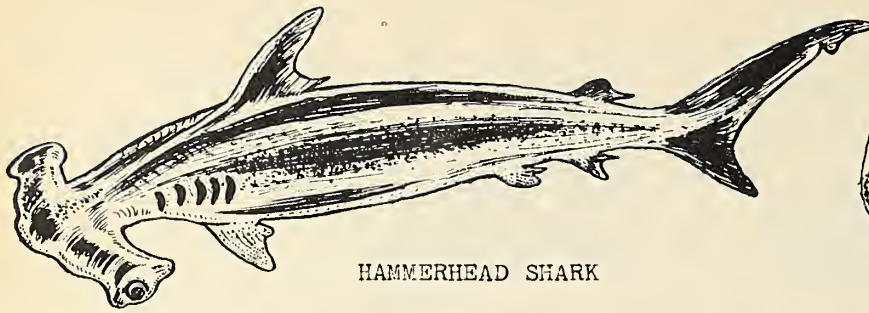
Some of the strange creatures of the open sea occasionally wander into the waters of our Chesapeake Bay. Few of them come very far inside the Virginia capes where they soon fall victim of the nets and lures of the fishermen, but now and then, they may be recorded within Maryland. They have perhaps been led so far astray by the quest for food or, being in a dying condition, they have drifted in with the flooding tide.

One of the strangest of these visitors is the hammerhead shark. Its head is very broad with the eyes at the outer edges, so that when we look downward on the shark the head appears like the head of a hammer with the body as the handle. The name "shark" usually puts us on the alert because of the reputation which this class of animals has for attacking anything that swims.

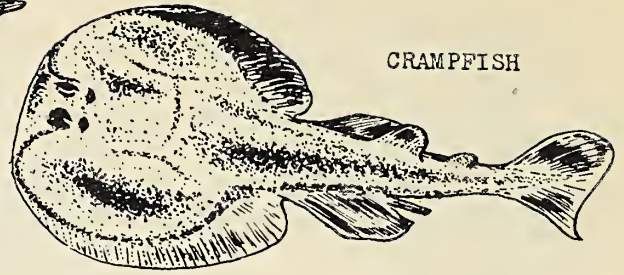


SEAHORSE

Drawings mostly after Hildebrand and Schroeder
by ROMEO MANSUETI



HAMMERHEAD SHARK



CRAMPFISH

But the hammerhead is not dangerous to man; there seems to be no record of its ever having attacked a human being. No one need fear it in the Bay, anyway, for the ones taken have been small, about two feet in length.

Many years ago, sailors told tall tales of great fish that sawed through the hulls of their wooden ships. There is, indeed, a sawfish which gets its name from its long snout with a row of strong teeth along each side. The "saw" cannot be used, however, in the same manner as our hand tool which requires a back and forth movement. Instead, the fish strikes with great force from side to side. Imagine what this weapon does when the sawfish swims through a dense school of smaller fish, thrashing its great tooth-studded saw about in the closely packed mass. The poor victims of these slashes make easy prey when the sawfish comes back along its route. The sawfish reaches a length of 20 feet. It has been reported fairly often in the lower Bay by fishermen whose nets it greatly damages.

The skates hardly look like fish at all. They are very flat, disc-like or squarish in shape. Several different kinds have been found in our Bay, mostly in the lower part. The spotted skate reaches a length of six feet but the ones taken in the bay are much smaller. Little is known of its breeding habits except that the eggs are laid in leathery pouches, sometimes called mermaids' purses. If you have ever been to the seashore you may have seen these cases. They are nearly square and from each of the four corners there is a long projection which is probably an aid in anchoring the cases by curling around pieces of seaweed. Nevertheless, storms must tear them loose, for they can often be found on the sand of the ocean beaches.

While the crampfish looks much like the skates, it is even more strange, for it can produce a strong electric shock. It seems to use this power to kill or paralyze other fish for food. A really large crampfish could knock a man down with its electric shock but in the Chesapeake there is little danger of this, for this species has been rarely reported and only in the lower part.

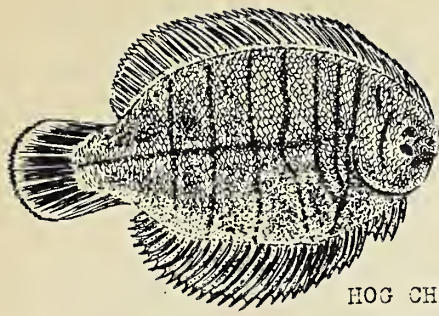
In days of old, knights protected their bodies with armor, and so do two kinds of fish found in the Chesapeake. Thick bony plates cover the head, back and sides of the sturgeon, which is the fish which produces caviar. In years past the sturgeon was quite common in our Bay and fish were taken which were nine feet in length. Now, however, the sturgeon fishery is very poor. As in many other cases, the fishermen were not very wise and caught so many that few were able to escape to lay their eggs. So the sturgeon, well protected against enemies in the water, have gradually disappeared because their armor is of no use against the enemy which defeats them with nets.



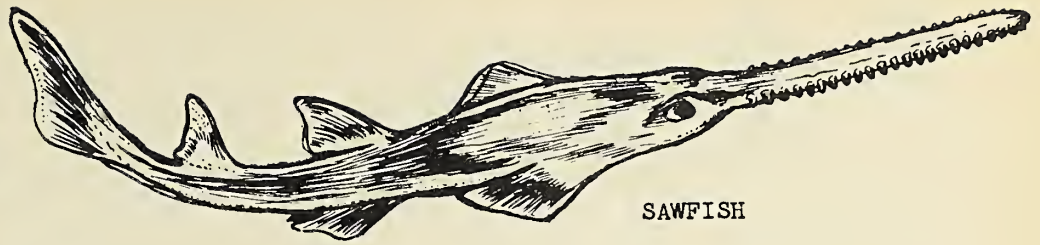
GAR PIKE



STURGEON



HOG CHOKER

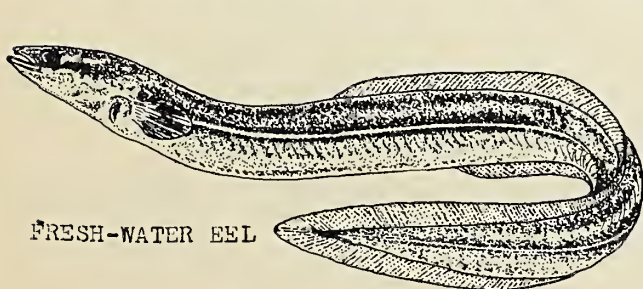


SAWFISH

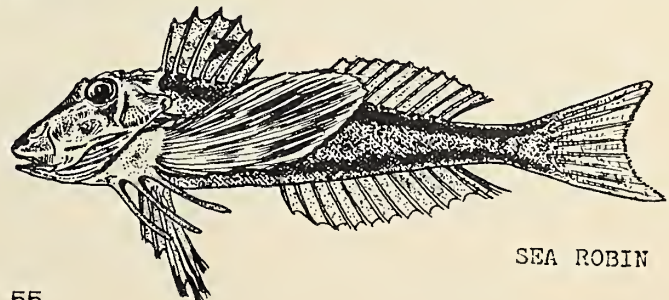
The gar pike is another one of the odd armored fishes. It may be quickly recognized by its beak-like snout and its rough, bony head. Fishermen have sometimes been injured while handling these fish because the edges of the armor plates are very sharp. Unlike the other fish we have described up to this point, the gar pike is not a salt water fish but an inhabitant of fresh water. For this reason it is not common in the open Bay, but it can be found in the tidal creeks.

Slippery is the eel and many a new fisherman has been surprised to pull in a line bearing one of these weird, wriggling creatures. It is a true fish and it has as strange a life story as it has an odd shape. The story was not uncovered until 1895 and even after years of scientific detective work it is not complete. The adult eel spends most of its life in fresh water, but when the time for spawning (egg-laying) comes the eels leave the fresh water rivers and swim out into the brackish water of the Bay. They do not stop here, but continue down the Bay, into the salty waters of the sea and far out into the ocean depths southwest of Bermuda. There they lay their eggs and then they probably die. When the young eels hatch they look as little like the adults as a caterpillar looks like a butterfly and so are called larvae. They are ribbon-shaped and entirely transparent except for their eyes. They have well-developed mouths with large teeth and are able to catch food easily. Feeding well, they develop by losing length and gaining width. Meanwhile they have been traveling and at last they reach the Chesapeake where they are called glass eels because they are still largely transparent. But once they come into fresher water, they gradually change to the color and shape of the adult eel.

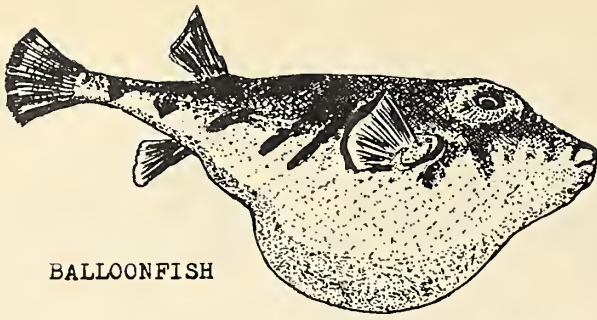
The hog choker is as broad and flat as the eel is long and slim but it too changes a great deal in growing up. These fish after hatching appear and swim for a while as normal fish do. But as they grow they develop the habit of lying on one side on the bottom of the Bay. Then a remarkable thing happens. The eye on the bottom is useless when the fish is lying on its side and now it begins to twist around until at last it rests on the upperside where it is of some use. So the adult hog choker has two eyes on the right side, which is the upper side when it is lying on the bottom, and no eyes on the left or lower side. And another odd thing: the right side becomes dark like the background of mud on which the fish rests but the under side is quite light. While the hog choker is common in the Bay, it is not an important food fish, for it only reaches a length of about seven inches. It got its name from the fact that hogs, feeding on the fish stranded along the beach, have difficulty in swallowing them because of their hard, rough scales.



FRESH-WATER EEL



SEA ROBIN



BALLOONFISH

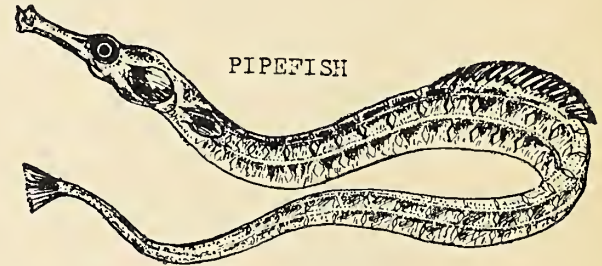
Few people would ever think that the seahorse was a fish. Unlike other fish it swims in an upright position; its head looks much like that of a horse; and its tail can be curled around objects like the tail of a monkey. But this is not all. It carries its young around in a pouch like a kangaroo, only it is the male, not the female, which has the pouch,

incubates the eggs, and protects the young. In spite of all this it is just as much a fish as is a perch, for it has fins and breathes by means of gills. Seahorses have been taken in Maryland waters but they are usually found in the Virginia part of the Bay.

A relative of the seahorse is the pipefish which is quite common in the Chesapeake. Although it is an odd, slim animal, it looks more like a fish than does the seahorse. The male pipefish also carries the eggs and young around in a pouch until they are ready for independent life.

The sea robin is a colorful fish which spends a good deal of its life walking on the bottom of the Bay. Its long pectoral fins, which are much like those of the flying fishes, have the three lower rays free from each other and developed as feelers. With these it moves about on the bottom, liking especially places which are sandy. It is quite common in the Chesapeake but it is not large, being rarely over a foot long.

The balloonfish has the ability to inflate its body when it is attacked. In this way it sometimes escapes its enemies by making itself too large to be swallowed. It is often caught with hook and line and when brought aboard appears as though the fisherman had caught a prickly bag of wind. It seldom is more than 10 inches long and has no value as food, but its strange balloon habit can help to make a dull fishing trip more interesting.



PIPEFISH

The last of our queer fish is one of the queerest of all. It does not get far up into the Chesapeake, but it was famous two thousands years ago since it is found on both sides of the Atlantic. All-mouth is one name, for it has an enormous grinning mouth. Goosefish is another name, but the reason is not clear. Probably the best name is angler, since this fish carries on the front of its head a long rod from which dangles a little flap. This equipment the angler fish uses just like a fisherman uses his rod and lure, attracting smaller fishes close so that the great mouth can easily swallow them.

Indeed, our Chesapeake holds wonders enough!

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Youghiogheny River below Swallow Falls

Photographed by Earl H. Palmer

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MARYLAND NATURALIST



THE INDIAN SUMMER

That soft autumnal time
Is come, that sheds, upon the naked scene,
Charms only known in this our northern clime --
Bright seasons, far between.

The woodland foliage now
Is gathered by the wild November blast;
E'en the thick leaves upon the poplar's bough
Are fallen, to the last.

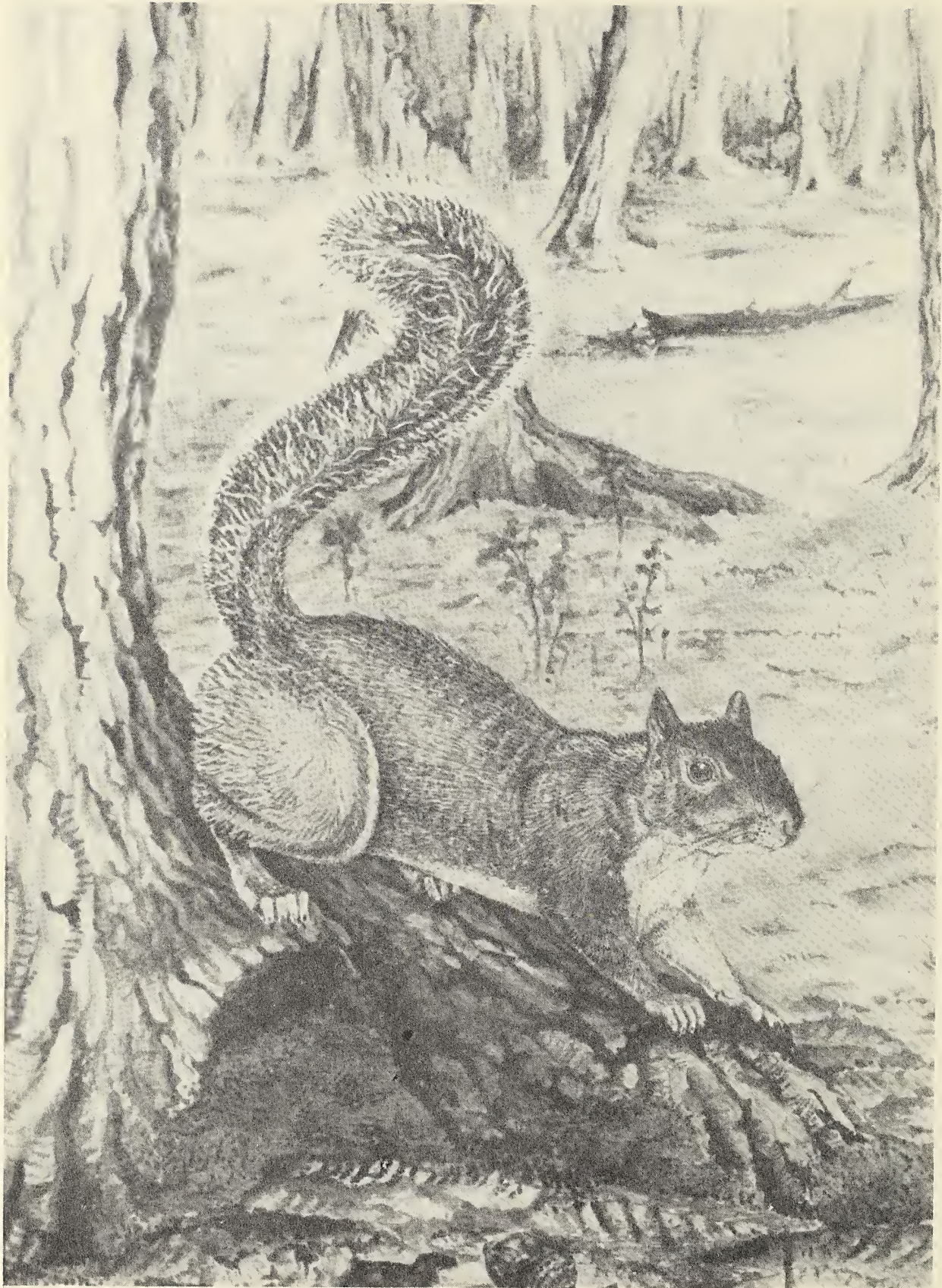
The mighty vines, that round
The forest trunks their slender branches bind,
Their crimson foliage shaken to the ground,
Swing naked in the wind.

Some living green remains
By the clear brook that shines along the lawn;
But the sear grass stands white o'er all the plains,
And the bright flowers are gone.

John H. Bryant



PUBLISHED by THE NATURAL HISTORY SOCIETY OF MARYLAND
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WINTER, SPRING, SUMMER, FALL



Gray Squirrel

From a painting by Joseph A. Bures

MAMMALS OF A LIMITED AREA IN MARYLAND

An Ecological Study In The Bare Hills-Lake Roland Area

by

Joseph A. Bures

It is only through the intensive study of local habitats that the specific scientific data can be amassed from which are evolved the broad, generalized biological theorems applicable to vast areas having similar, or perhaps parallel, ecological properties.

The following data are a compilation of field and laboratory notes recorded from January 1941 to January 1947 inclusive. The writer is deeply indebted to Mr. Conrad P. Kenney, who was largely responsible for the collecting and preservation of the specimens listed. Appreciation is also extended to Dr. Remington Kellogg and Mr. Harold Shamel, both of the United States National Museum, for their assistance in the identification of several of the insectivores.

The area under consideration with its culture and its geographical location within the state is illustrated in Plate I. For purposes of identification and reference the area has been termed "The Bare Hills-Lake Roland Area" after its two principal features.

Lake Roland, forming the northern and eastern boundary of the selected area, is an artificial body of water. After the increase in population in the City of Baltimore and the expansion of industry during the 1850's, the city fathers came to the realization that the growing metropolis needed a more adequate water supply. Up to this time the city had been dependent on private wells and a small "waterworks" purchased from the Baltimore Water Company. The Lake Roland dam and service reservoir remained the city's chief source of water until 1915, at which time the present source, the Loch Raven Reservoir, was completed.

GEOGRAPHY

The geology, topography, and plant communities found in the area are illustrated in Plate II. Since the distribution of mammals in any given area is directly influenced by these factors, some of which may form natural barriers within the area itself, Plate II will be referred to constantly. It must be understood, however, that the lines that define the limits of each respective area are not as abrupt as indicated, there being a transition or modifying stage between each.

The Serpentine Barrens form approximately one-fourth of the total acreage. The soil overlying the Serpentine Formation is largely Conowingo Clay, and, due to the presence of a certain amount of chrome-bearing ore in the ground, it has a very definite bluish-green cast, particularly noticeable during the winter, when the sparse, dried field grasses reveal huge patches of bare ground. The predominant vegetation of the barrens consists of scattered groups of trees of two species, *Pinus virginiana* and *Quercus marilandica*, a few wild berry bushes and numerous field weeds and grasses. There is little or no ground cover for the smaller mammals. In seven years of constant trapping, not one rodent or insectivore, the two most abundant mammalian orders frequenting the Lake Roland Area, was collected on the Serpentine Formation. Even the larger mammals seem to shun the barrens, though an occasional fox, raccoon, or skunk may be seen traversing the hills, or following one of the many small ravines down to the

wooded areas bordering the lake. The only mammals that regularly inhabit the Serpentine are the bats, and with the coming of winter these hibernate in either of the two chrome mines, not worked since the 1860's (see Plate I), or migrate to a warmer climate.

The highest elevations are reached on the Serpentine Barrens, and are figured on the topographical map (Plate II, Fig. 2). It will also be noted from this same map, that the entire area has a tendency to slope toward the lake, reminding one of the valley that existed, according to early literature, as a densely wooded gorge, in place of the present mile-long lake.

With the exception of the areas supporting houses, farm buildings, and industrial structures (see Plate II, fig. 3), the remaining three-fourths of the area is extensively vegetated, in marked contrast to the Serpentine Barrens. Surrounding the Serpentine Formation in a pincer-like fashion is an area formed of Wissahickon Schist overlain with a soil of micaceous character. Adjacent to this are the three remaining geologic formations: a small strip of Cockeysville marble, covered with a reddish loam, a larger section composed of Gabbro, overlain with Cecil Clay, and a piece of ground larger yet, underlain with Baltimore Gneiss and covered with Cecil Loam. These geologic formations and their overlying soils are more favorable to plant growth than the mineral-impregnated ground of the Bare Hills.

There are three streams in the area; two flow into Jones's Falls below the dam, the other flows into Lake Roland. All three originate in the Serpentine Barrens and are spring-fed. There is another small body of water, being more of an inlet or small bay than a stream, extending a short arm into the area just west of the stream that empties into the lake. Its banks support a luxurious growth of vegetation with homes for a host of small animals.

The various types of plant life supported by the above terrain are shown in Plate II, fig. 3.

DISTRIBUTION AND ABUNDANCE

At Lake Roland the distribution of the mammalian population is directly influenced by several factors which, in most part, are applicable to any given area. The relationship of these factors to one another is directly responsible for the abundance or scarcity of any particular species. Since all are directly interrelated, they can be considered collectively as a single force. As an individual the species fights for its existence when one or more of these factors are at variance. If there is a subtle, imperceptible, orderly progression of changes in these factors, the race may perpetuate itself in the area through the adaptabilities of its individual representatives. Since the area under consideration has been proposed as the site for a recreational area, it will be interesting to sample the mammalian populations some years hence. It is to aid future workers that the series of maps (Plates I, II and III) have been prepared.

Some of the more apparent factors controlling the mammalian population at Lake Roland are as follows:

The geology and topography of the area. Physiography sets a limit to the distribution of some species, an example of this being the muskrat, which is limited at Lake Roland to the marsh at the northern end of the area.

The food supply. This is related to the soil, which in turn, is dependent upon the underlying rock formations, for it is the soil which determines the type of vegetation upon which the herbivores may feed. And the herbivores are but a link in the chain, for they form a part of the diet of the carnivores.

Ground cover. This is a necessity for some of the smaller mammals. It is a limiting factor for such mammals as the shrews and moles, which require that the soil, its consistency, and covering meet certain requirements for their burrowing and tunneling in search of food and shelter. With the larger mammals it consists of the availability of den trees and other suitable locations for rearing a family.

The above factors when coupled with Plates II and III, should serve to clarify some of the reasons why the various species of mammals at Lake Roland have confined themselves to their respective areas.

An indication of the relative population of the various species at the Lake Roland-Bare Hills area, was obtained during the seven year period by a tabulation of trapping records supplemented by field observations.

ACCOUNTS OF SPECIES WITHIN THE AREA

Specific data pertaining to the occurrence and relative abundance of the mammals recorded in the area are listed in the accounts of the species that follow.

1. *Didelphis virginiana virginiana*Opossum

The opossum is one of the mammals of the region for which there are very few records. Though the natives of the vicinity claim them to be quite common, we were almost two years in securing our first authentic record. On June 22, 1944 an adult male was noted on the Falls Road, just north of the overpass bridging Jones' Falls. He had just been killed by a passing motorist. On July 18, 1946, we recorded another individual in the mixed deciduous woods bordering the "isolated" cornfield. Being a sight record it was impossible to determine the sex of this particular individual. There are no further records of the opossum in our files for the Lake Roland area; however, on numerous occasions we have noticed skins of these animals stretched and drying in front of buildings of the Negro settlement along Falls Road. It proved to be impossible to determine whether or not these specimens were collected from the area under consideration.

2. *Scalopus aquaticus aquaticus*Common Mole

The common mole is apparently restricted to the moist, wet, soil

bordering the lake, and along the two streams that empty into Jones' Falls. The tunnels which these small mammals excavated at Lake Roland suggested those of *Condylura cristata* to such an extent we repeatedly expected to find the star-nosed instead of the common mole. Numerous individuals have been observed at work on many of the lawns fronting properties along Falls Road, though the people living in this region state that they are never a serious problem. As mentioned above, they show a preference for moist situations within the area..

3. *Sorex longirostris longirostris*Bachman's Shrew

The long-tailed shrews of Lake Roland have been assigned to this species after a careful check of a series of fourteen specimens from the area. When the first specimens were collected, they were ascribed to *S. cinereus fontinalis*, the Maryland shrew. Subsequent collecting and investigation, however, changed this opinion. The skins were then submitted to the United States National Museum for a comparison with their large series. After examining the material, Dr. Kellogg agreed with Mr. Kenney that the specimens should be regarded as *S.l. longirostris*.

With two exceptions, all of the shrews were collected in the mixed deciduous woods bordering the railroad siding in the northern portion of the area. Of the two exceptions, one was trapped in a dense tangle of sumac and honeysuckle bordering the marsh, and the other in a very similar habitat along a small stream paralleling falls Road.

These shrews are quite common in the area. During the winter and spring of 1941-1942, they seemed to be particularly abundant, as many as four being trapped at the base of one tree during one night. Systematic trapping throughout all sections of the area confirmed the opinion that the long-tailed shrew does not wander far from the deciduous woods. It is also interesting to note that in the immediate vicinity of the areas frequented by *Sorex*, *Blarina* was rarely present. There was but one such occurrence: a *Blarina* that, after devouring a trapped specimen of *Sorex*, itself became a victim of the next trap in the series.

4. *Blarina brevicauda brevicauda*Short-tailed Shrew

The short-tailed shrews comprise approximately thirteen per cent of the mammal specimens trapped. They are as expected, one of the most common mammals in the area. They have often been observed foraging for food during broad daylight, and on many occasions, have been trapped almost before we had removed our hands from the traps we were setting.

The short-tails at the Lake Roland area live in a variety of habitats, as can be seen from an inspection of Plate III; however,

they seem to show a preference for the deciduous wood-borders, honeysuckle, and sumac tangles.

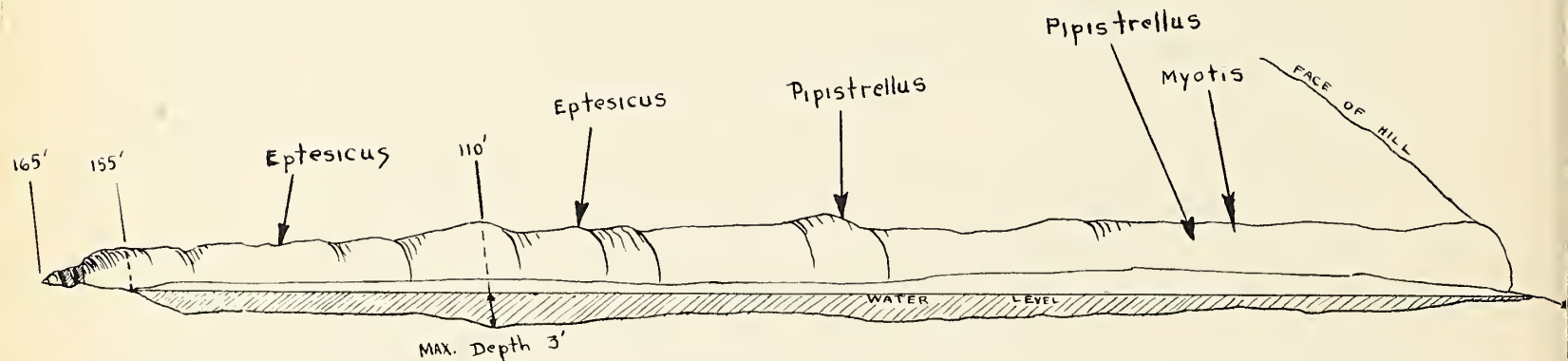
5. *Myotis keenii septentrionalis*.....Trouessart's Bat

Known only from the two mines adjacent to the Old Pimlico Road. Seven specimens were collected from the larger of the two mines (mine no. 1, Plate I). All were taken during March and April, 1941. The population is probably quite variable; during 1941 we tabulated thirty *Myotis* hibernating here, but during 1942 to 1946 the figure dropped to almost half that number (1942: 12; 1943: 22; 1944: 14; 1945: 20; 1946: 16). The external measurements of the bats collected are listed below since some of these individuals exhibited marked deviations from the normal measurements for this species. Average measurements are as follows (Miller, 1928; Hamilton, 1943), total length, 84.1 mm.; head and body, 42.4 mm; tail, 41.7 mm; hind foot, 8.4 mm; forearm, 36.7 mm; ear from meatus, 16.2; ear from crown, 14.0 mm; metacarpals, graduated, 30.0 mm-32.3 mm.

Acc. No.	Sex	Ear from crown	Ear from meatus	Width of ear	Head & Body	Tail	Tibia	Tarsus	Forearm	Metacarpals			
										3	4	5	
1	♂	15.0	-	-	44.0	25.0	14.5	7.0	32.0	29.5	29.5	30.5	March 3, 1941
2	♀	18.0	19.0	10.5	46.5	32.5	14.5	8.5	32.5	27.5	27.5	27.5	} March 30, 1941
3	♀	18.0	19.0	11.0	41.5	35.0	15.2	8.0	33.0	28.5	28.5	28.5	
4	♂	13.5	15.0	9.0	43.5	35.0	17.5	8.5	35.0	31.0	31.0	31.0	
5	♂	13.5	15.5	8.5	44.0	37.0	15.0	7.0	32.0	29.0	29.0	29.0	
6	♂	15.5	17.0	10.0	42.0	29.0	16.5	7.5	34.5	28.5	28.5	28.5	April 1, 1941
7	♂	15.0	16.5	10.0	42.5	32.5	14.5	7.5	32.0	28.5	28.5	28.5	April 19, 1941

Comparison with the average measurements indicates that some of the bats collected have a *smaller forearm, longer ears, smaller metacarpals* and much *shorter tail*. (See Plate IV). This series was submitted to the United States National Museum for inspection and review; the diagnosis was that the specimens were undoubtedly Trouessart's bat though they admittedly exhibited some very unusual individual variations (H.H. Shamel, *in litt.* 1945). *Myotis* seemed

to prefer crevices in the sides of the mine during the hibernating period, while *Pipistrellus* and *Eptesicus* were usually found hanging free from the roof. *Myotis* is apparently the only species of bat hibernating in groups at Bare Hills; they were invariably found ten or twelve together in a crevice with just their noses protruding. *Pipistrellus* usually was found individually, though on two occasions three were found hanging together. *Eptesicus* was recorded hibernating as solitary individuals only. With respect to their position and location in the mines *Myotis* was always found near the entrance, not more than 25 to 30 feet from the opening; *Pipistrellus* a little farther back, anywhere from 25 to 75 feet; and *Eptesicus* hibernated at 125 feet from the entrance. These figures are for the stable, undisturbed winter community; at times the bats were aroused, and the individuals shifted their positions slightly, on one occasion a *Pipistrellus* being taken among a group of six *Myotis*.



Average Temperatures During Hibernating Periods.

DISTANCE BACK	AT MOUTH	40'	85'	125'	155'	165'
Temp. of Air	46°	60°	59°	58°	57°	58°
Temp. of Water	49°	51°	52°	51°	50°	-

Though many bats were noted during the summer months, none was collected. It is interesting to note that not a single specimen of *M. l. lucifugus* was collected in the area, a species usually quite common throughout the state.

6. *Pipistrellus subflavus subflavus*Georgian Bat

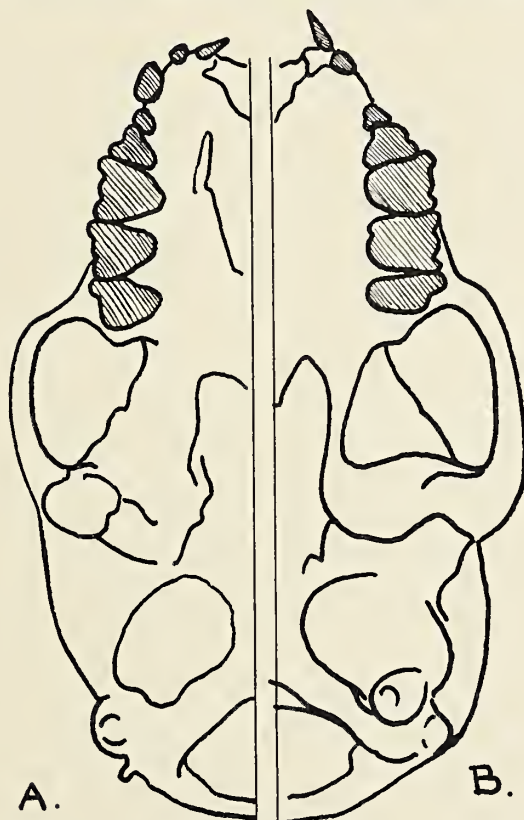
Known only from the two mines. These bats were usually found

hanging free, looking very much like a suspended gem, each body hair containing at its very tip a tiny globule of condensed body moisture.

Though it is well known that individuals of the genus *Pipistrellus* vary greatly as to coloration, dentition, and cranial characters, three specimens were taken which exhibited such marked variations that they are worthy of note. Two were partial albinos and are featured in figures 1 and 2, Plate IV. Both were collected in mine no. 1, January 26, 1943. One specimen is quite white; the other is a form intermediate between it and a normally colored individual.

The third specimen exhibited unusual dentition and cranial characters. It is a male, collected about 25 feet from the entrance of mine no. 1, March 30, 1941. In external measurements it varies but little.

The accompanying illustration (greatly enlarged) shows some of the differences in dentition and skull characters.



Ventral view of (A) normal pipistrelle skull, and (B) an individual collected at Bare Hills March 30, 1941.

The cranial differences between this specimen and a normal individual are as follows.

- (1) There are no canines in the maxillary row, and there is no ridge in existence in a lateral view of the skull to indicate that they were ever present. Though there is a space between the incisors and premolars, it is smooth and rounded and has no evidence of a socket for the insertion of the canine. Being aware of the fact that *Pipistrellus* is subject to abnormalities in dentition we expected to find further records of missing canines for this species. A search of the

literature, however, revealed none, and an examination of 96 specimens in the Biological Survey Collection plus 118 specimens in the mammal collection at the United States National Museum was equally fruitless, though other dental abnormalities, particularly among the incisors, were noted.

- (2) The braincase is relatively broader, and it has an obvious depression in its dorsal line.
- (3) The rostrum is visibly more angular at the anterior portion; the incisors are larger and protrude forward in marked contrast to their position in a normal individual. The rostrum has an unusually long nasal opening in comparison with a normal specimen, thus making the condylobasilar length relatively shorter.
- (4) The canines are present in the lower mandible, though the rest of this portion of the skull conforms with the abnormalities of the cranium.

7. *Eptesicus fuscus fuscus*Big Brown Bat

Specimens taken in mine no. 1 only. This is a common resident, ranging throughout the area. The bats are the only mammals that regularly inhabit the Serpentine; they can be seen any summer evening, foraging above this portion of the area.

8. *Procyon lotor lotor*Eastern Raccoon

Uncommon visitor to the area. One individual was found along the railroad siding opposite the cornfield (March 23, 1943). It was a pregnant female (6 embryos present) and when examined was found to have been shot. Since the enactment of the law prohibiting firearms at Lake Roland in 1946, incidents such as this have ceased. The raccoon has also been observed along Jones' Falls below the dam, and on several occasions along the marsh edge.

9. *Mustela frenata noveboracensis*New York Weasel

Ranges throughout the area avoiding only the marsh and the Serpentine (see Plate III). Though at first (1941) the weasel seemed quite rare at Lake Roland, subsequent investigation revealed that these small carnivores were more common than suspected. They seem to use the railroad right-of-way as a natural highway regularly; their mortality rate is high here, since an average of four specimens a year have been recorded killed by passing trains. In an area as small as the one being considered, this is a fairly high figure.

10. *Mephitis mephitis nigra*Eastern Skunk

Same habitats as above. Though they represent only a small portion of the entire mammalian population, skunks are seen quite often and there have been many occasions when I have surprised them as I "rounded-the-bend" along the railroad tracks; they too, seem to use the railroad as a natural highway and as a result also suffer the inevitable reduction of their numbers by passing trains.

11. *Urocyon cinereoargenteus cinereoargenteus*Northern Gray Fox

An uncommon visitor at the Lake Roland-Bare Hills area. One specimen was found in a decomposed condition on the Serpentine Barrens. While I was accompanied by Mr. Irving Hampe and Mr. Milton Vincent, of the Natural History Society, two were observed along a wooded path leading from the barrens down to the lake (February 20, 1944).

12. *Marmota monax monax*.....Southern Woodchuck

Not very common. Range limited to the areas of cultivation, and to the area between the deciduous woods and the marsh. Most often recorded near the "isolated" cornfield.

13. *Tamias striatus fisheri*.....Fisher's Chipmunk

Quite common in suitable places along the railroad right-of-way, and in the area between woods and lake.

14. *Tamiasciurus hudsonicus loquax*Southern Red Squirrel

Common resident in the deciduous woods. It has been stated in various publications that the red and gray squirrels seldom occur in the same locality. However, at Lake Roland both species abound in the deciduous woods; an area covering not more than a dozen acres.

15. *Sciurus carolinensis carolinensis*Southern Gray Squirrel

Habitat same as the red squirrel. Quite common in the area.

16. *Glaucomys volans volans*Small Eastern Flying Squirrel

Habitat essentially the same as for the above two species of squirrel, though the flying squirrel prefers that portion of the woods which includes the largest trees. About as common as the chipmunk, but being a nocturnal species, it escapes general notice.

17. *Peromyscus leucopus noveboracensis* ...Northern Deer Mouse

Sometimes referred to as the white-footed mouse, this is the most common mammal in the area. With the exception of the marsh and Serpentine, the deer mouse is found throughout the area; but it is concentrated at the edges of the deciduous woods and the honeysuckle and sumac tangles.

18. *Microtus pennsylvanicus pennsylvanicus*Meadow Vole

The meadow vole is the second most common mammal in the area. While individual specimens have been trapped throughout the area, the

meadow vole prefers the low fields bordering the marsh, and the cultivated areas.

19. *Pitymys pinetorum scalopsoides*.....Northern Pine Mouse

Pine mice are found in very much the same situations as the long-tailed shrews at Lake Roland. They are the small mammals of the forest floor that resemble *Microtus* to a certain degree. The three most common species, *Peromyscus leucopus*, *Microtus pennsylvanicus* and *Blarina brevicauda* inhabit the region in such large numbers that collectively they account for over half the entire mammalian population.

20. *Ondatra zibethica macrodon*.....Common Muskrat

Known only from the marsh at the northern portion of the area but quite common there. The muskrat is the only species in the area whose existence is jeopardized by other than natural enemies. The species has been consistently trapped for the past ten years. In 1941 there were no muskrat lodges built, all of the animals living in homes in the bank. At the time of the last visit to the area (June, 1947) there were seven of the more familiar dome-shaped structures straggling in an uneven row in the middle of the marsh. What caused the change is unknown. It has been noticed that the marsh is yearly increasing its acreage and it is possible this motivated the change. Another theory is that the muskrats may have moved to the center of the marsh in self defence, the lodges being more difficult to approach, even when the marsh is frozen over.

21. *Mus musculus musculus*.....House Mouse

Common wherever human dwellings occur. Several were collected in the isolated marsh.

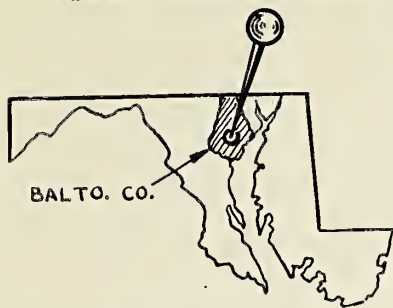
22. *Rattus norvegicus*.....Norway Rat

Not common in the area, but they are quite numerous on the west side of the Falls Road near the Old Pimlico Road, due to an area that has been set aside for dumping refuse. Several were collected in the "isolated" cornfield.

23. *Sylvilagus floridanus mallurus*.....Eastern Cottontail

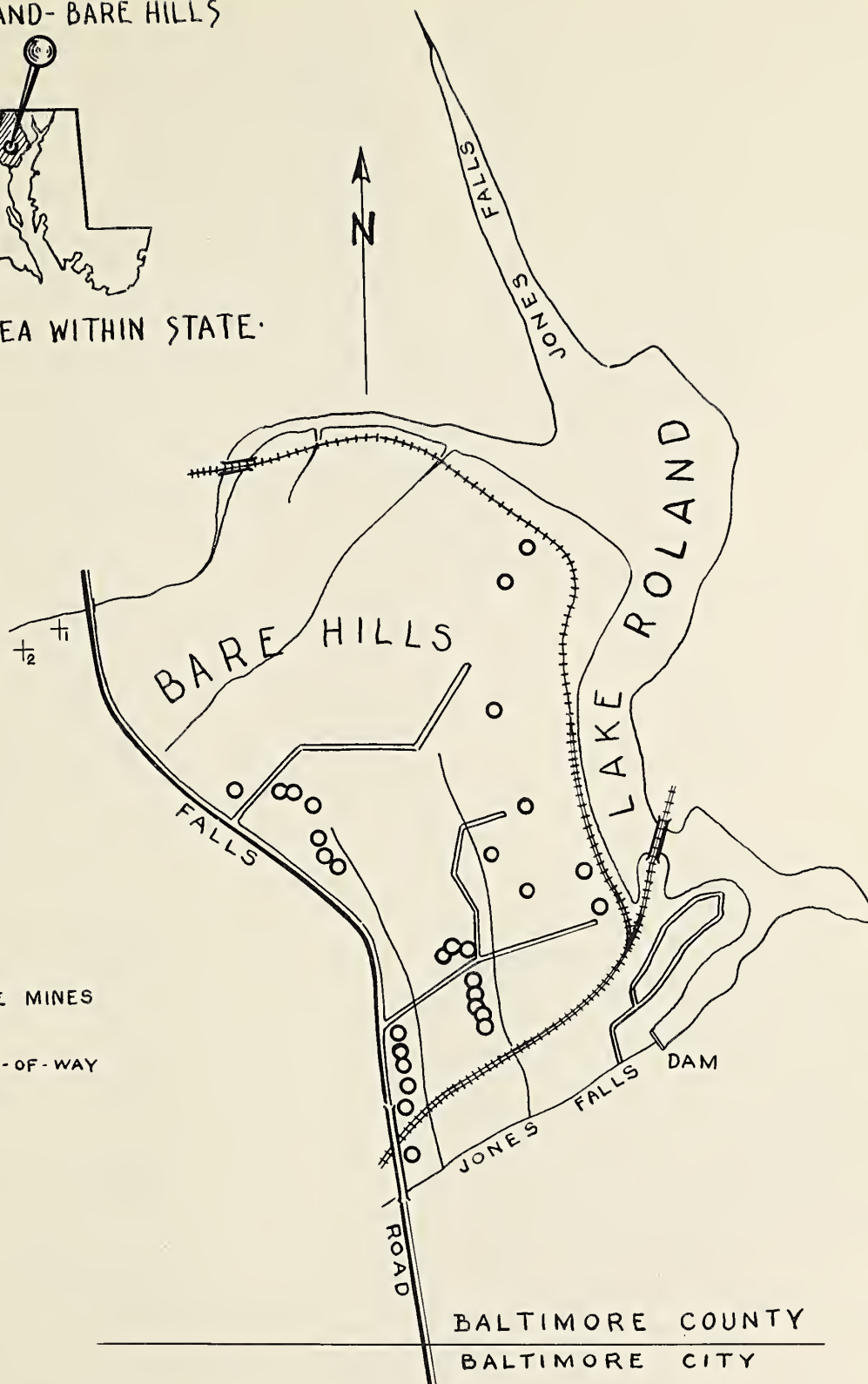
Ranges throughout the area with the exception of the Serpentine and the marsh. Though there are many localities suitable for it, the cottontail does not seem to be very common.

LAKE ROLAND-BARE HILLS



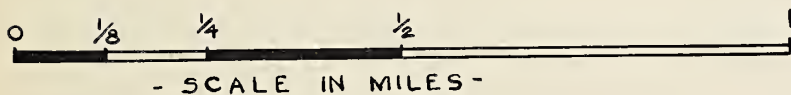
BALTO. CO.

• LOCATION OF AREA WITHIN STATE •



- LEGEND -

- HOUSES
- +₂ CHROME ORE MINES
- == ROADS
- ++++ R.R. RIGHT-OF-WAY
- ~ STREAMS



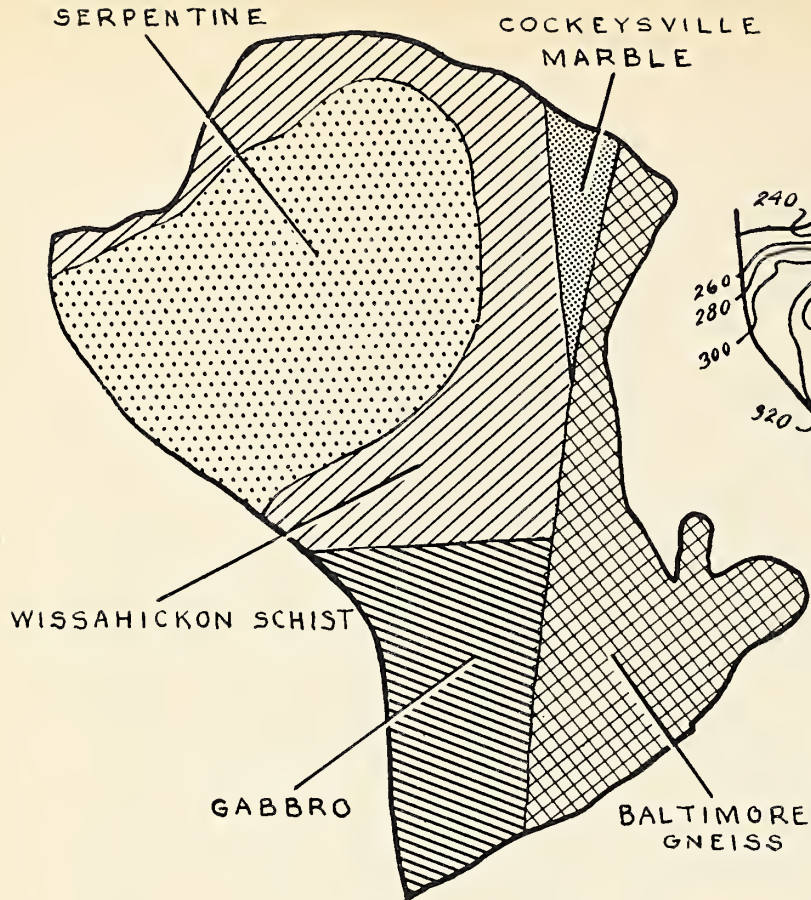


FIG. 1
GEOLOGY

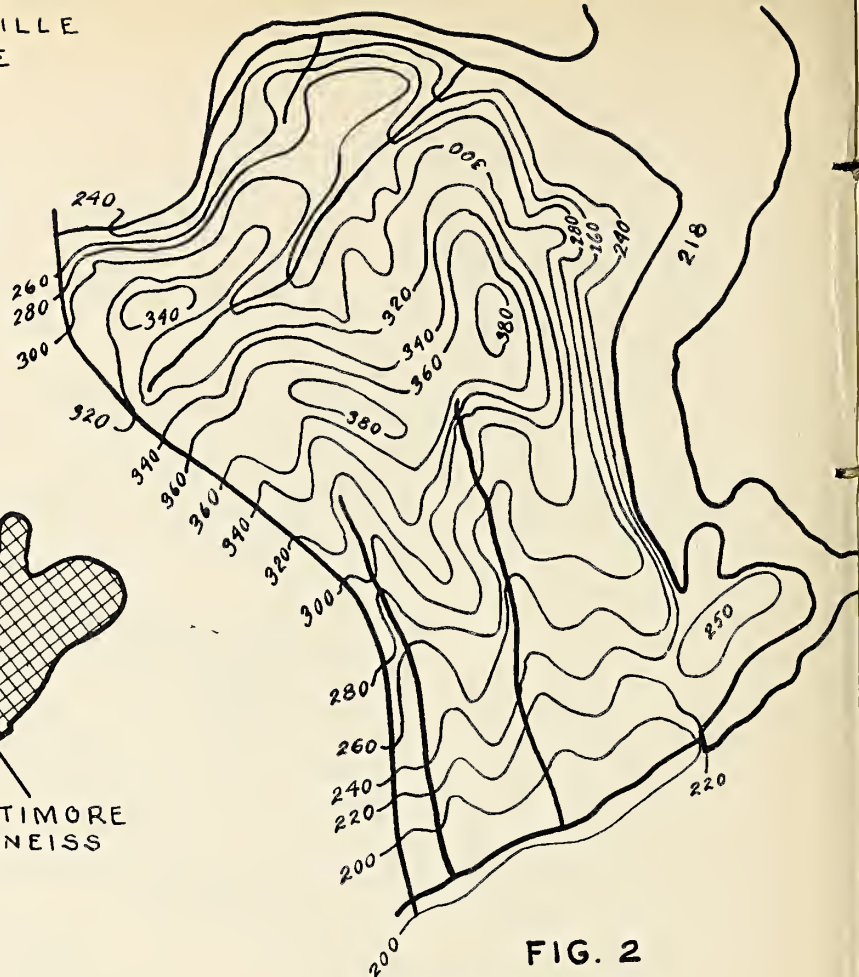


FIG. 2
TOPOGRAPHY
ELEVATIONS GIVEN IN FEET ABOVE SEA LEVEL

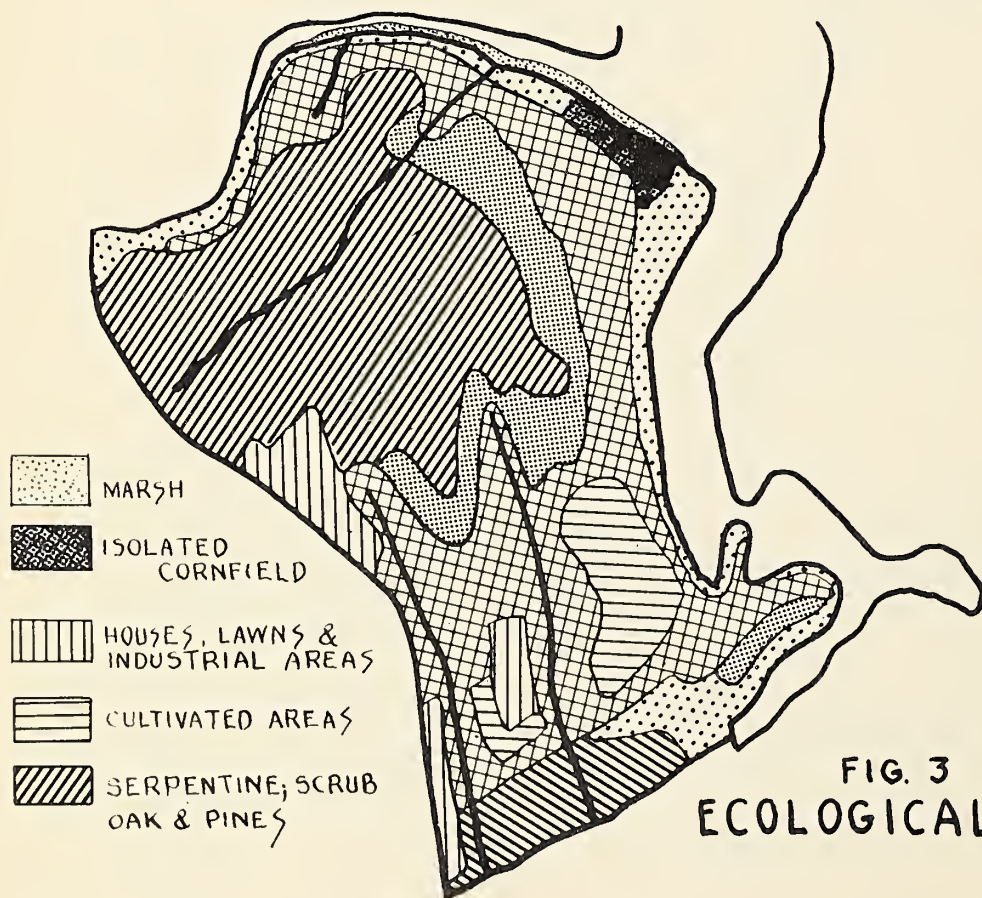


FIG. 3
ECOLOGICAL AREAS

LEGEND...FOR FIG. 3 ONLY

-  MIXED DECIDUOUS WOODS
-  OPEN FIELDS; SUMAC & GRASSES (ARID)
-  INUNDATED FIELD; BRUSH, BERRY BUSHES, SAPLINGS
-  BRIARS, SUMAC, WILLOWS & HONEYSUCKLE (WET)

DECIDUOUS WOODS INTERSPERSED WITH
A FEW PINES... MAINLY SYCAMORES,
OAKS AND MAPLES; THICKET-BORDERED STREAMS

BRIARS, SUMAC, SAPLINGS,
WILLOWS, AND HONEY SUCKLE

SERPENTINE
BARRENS

OPEN,
GRASSY
FIELDS

SUMAC
FIELDS

ARID,
STONY
SOIL

SAND AND CLAY,
LITTLE GROUND COVER

MOIST, HUMID
SOIL

MOIST, HUMID SOIL
ABUNDANT GROUND
COVER

CULTIVATED
GROUND

ABUNDANT GROUND COVER
MOIST, WET SOIL

MARSH

MUD BANK

CORN FIELDS

WEEDS, THICKETS,
BERRY BUSHES, SCRUB

BRUSH AND
WEEDS

ONDATRA

SCALOPUS

MICROTUS, MARMOTA, TAMIAS, MUS, RATTUS

SOREX, TAMIASCIURUS, SCIURUS, GLAUCOMYS, PITYMYS

DIDELPHIS, BLARINA, PEROMYSCUS, MUSTELA, MEPHITIS, UROCYON, SYLVILAGUS

MYOTIS, PIPISTRELLUS, EPTESICUS, PROCYON

MAMMALIAN DISTRIBUTION... BY HABITAT

TYPICAL CROSS-SECTION, ILLUSTRATING THE RANGES OF THE RECORDED GENERA WITH RESPECT TO
THEIR PREFERENCE OF HABITAT; AND THE PREDOMINANT VEGETATION EXISTING IN THE AREA.

PLATE III.



FIG. 1

Pipistrellus subflavus s.
Partial albino collected
at Bare Hills Jan. 26, 1943



A

B

C

FIG. 2

Variations in coloration of
Pipistrellus collected at
Bare Hills.

- A. Normal coloration
- B. Specimen showing marked
tendency towards partial
albinism.
- C. Partial albino; pure white
except for facial mask and
wing and tail surfaces.



A

B

C

FIG. 3

The three species of bats collected at
the Bare Hills chrome mines.

- A. *Pipistrellus subflavus* s.
- B. *Eptesicus fuscus* f.
- C. *Myotis keenii septentrionalis*

Ventral aspect of Trouessart's Bat
Note size of ears: fur texture.

FIG. 4



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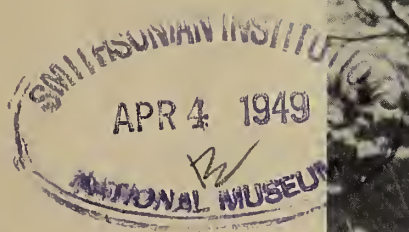
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MUSKRAT LODGE

Photographed

by

Haven Kolb



MARYLAND NATURALIST

The Natural History Society of Maryland

WINTER 1949

VOLUME XIX No. 1



MUSEUM OF NATURAL HISTORY
MARYLAND HOUSE DRUID HILL PARK
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MARYLAND NATURALIST



Making a New Year's resolution to cultivate some interest outside our regular business and occupation is one of our easier habits while cold winds blow and snow flurries splatter against warm windows.

We tell ourselves that a special interest in which we might satisfactorily use our minds with a real and continuing enthusiasm, could help us break up the routine of daily life which often seems to imprison us. What to choose is the problem - the prerequisites being that it must be inexpensive and fascinating.

If we decide to become more discerning naturalists all year round, and follow through completely with our interests, the rewards will prove to be more bountiful than we ever imagined.

We all can observe the world around us, but to do it carefully and discriminately marks the true naturalist. Once the fever of investigation overcomes us, it knows no limitations, and soon we begin to share our pleasure with friends, children and relatives, who may remark, "We've been blind all these years!"

One thing certain, a resolution to learn more about Maryland's outdoors and wildlife will not be easily broken.

Romeo Mansueti.



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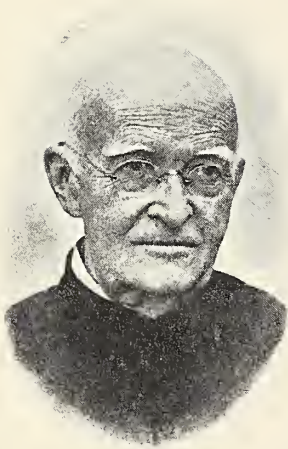
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VOLUME XIX No. 1
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APR 1 - 1949

IN MEMORIAM

Rev. John A. S. Brosnan, S.J.



On December 9, 1948, the Society lost a valuable member and a staunch friend, Rev. John A. S. Brosnan, S.J.

Father Brosnan was born in New York City, October 21, 1860. He attended St. Francis Xavier College in New York, where he received a Bachelor of Arts degree in 1878 and a Masters of Arts degree in 1879. That same year he entered the Novitiate of the Society of Jesus, then located at West Park on the Hudson, New York, where he spent the next two years. There followed a year of classical studies at Frederick, Maryland, after which he went to Woodstock from 1882 to 1885 to study philosophy. During the following year he taught at Loyola College, Baltimore, then returned to Woodstock to teach and to pursue further studies. He was ordained Priest in 1889.

From 1886 to 1940 he taught the physical sciences at Woodstock College. During those years he instructed generations of students, many of them future science teachers, in various branches of science which at different times included chemistry, mathematics, physics, biology, astronomy, geology, and experimental psychology. From 1940 until the time of his death he was Professor of Chemistry Emeritus at Woodstock College.

Father Brosnan was well known for his expert skill in photography. His interest in this field had begun as early as 1875, when as a college student, he took pictures on wet plates which he made himself. He became an expert in the preparation of lantern slides. Especially remarkable was his facility in reproducing so accurately by hand the colors of natural objects.

Father Brosnan was long a member of our Society and though he was quite some distance from Baltimore he was in frequent attendance at the Society's assemblies. He gave a number of lectures and aided the Society in many ways, making lantern slides and illustrations for our Journal.

His was a most genial and kindly nature. He endeared himself to everyone with whom he had any contact.

THE DEVELOPMENT OF NATURAL HISTORY

by

Taylor H. Greenfield

An obvious phase of modern scientific thought is the matter of precise definition. Whether the question is one of formal science embracing mathematics and logic or of empirical science embracing physics, chemistry, biology, geology, etc., the first step is to arrive at basic concepts and clearcut meanings. Not only is the area of inquiry carefully delineated but the multiplicity of derivative concepts is summarized in a very few which are fundamental in that they are capable of intuitive definition only. The whole complex study of forces and motions in physics, for example, is reducible to the interrelation of the three basic quantities of length, time and mass.

It is by virtue of the characteristic of definition that the scientific method has proved so fruitful. Since there is no doubt as to meaning, collaboration is possible among many investigators. The evidence that science accumulates is public in character and any one who understands is free to verify or disprove the results of a given experiment. Where clarity of meaning is lacking and the same words may have connotations varying from individual to individual, it would appear that real progress under the scientific method could be correspondingly impeded.

In this light it may not be unprofitable to consider what the term "natural history" ought to mean to us today. In themselves words are merely sounds with no meaning except that which current usage supplies; and from place to place and from generation to generation usage may and frequently does supply different meanings for the same sounds.

Prior to the establishment of science by Francis Bacon on the basis we practice it today, natural history covered a large but vague domain. Botany and zoology were always included in this branch of study and, insofar as a practical knowledge of food and medicinal plants was essential to agriculture and health, and breeding of domestic animals, to livelihood, these were sciences at the dawn of recorded history.

One of the earliest natural historians was Aristotle (384-322 B.C.) who was one of the first men to think of botany and zoology as a definite branch of knowledge. His "History of Animals," in ten books, included a general review of the animal kingdom with suggestions for a natural arrangement of animals in groups; described the external and internal anatomy of animals; various kinds of life such as cephalopods, crustacea, echinidae, insects; discussed reproductive functions in animal and man; and the character and habits of the animal world. Many things taken for granted by this philosopher were the results of faulty observation but where his facts were right his logic held good. His work is of highest importance because he discovered a new principle which is at the foundation of experimental science. Aristotle's great contribution was that nature works by definite fixed laws-what we now call the law of continuity. By virtue of this law experimental science can prophesy that the *same result* will always take place if the *same experiment* is performed under the *same conditions*.

Perhaps the most famous early natural history is that of Pliny the Elder (23-79 A.D.). His "Natural History" is dedicated to Titus, which dates the completion about A.D. 77. It is an encyclopedia of astronomy, meteorology, geography, zoology and botany, and also includes considerable essays on human inventions and institutions. Although supposed to be accurate, fact and fancy are blended to such an extent that it is hard to separate them.

Following Pliny up to the time of Bacon, natural history had little meaning. During the Dark Ages the monks compiled animal stories concerned primarily with pointing out a moral. These became known as the Physiologus. This developed into a similar book called the Bestiaries, of which the botanical counterpart was the Hortus Sanitatis, later the Herbals. At the beginning of the Revival of Learning the Dominican monk Albertus Magnus (1193-1280) began working on physical experiments, while the Dominican Thomas Aquinas (1225-1274) began to collect and coordinate all the scientific and philosophical knowledge of his day. Following these, the Franciscan monk, Roger Bacon (1214-1294) was the first real practitioner of science in the modern sense. Among his many writings are clear and unmistakable statements from which our knowledge of lenses dates. His work gave recognition to the opinions of others and set men on the right path regarding true observation, description and the use of modern laboratory instruments.

It is, however, Francis Bacon (1561-1626) who first offered a comprehensive program for the complete renovation and redirection of scientific knowledge and whose specific canons of experimental procedure have become part of the enduring structure of successful science. What natural history meant prior to Bacon's time is clearly stated in his "Novum Organum:"

"Nothing duly investigated, nothing verified, nothing counted, weighed, or measured, is to be found in natural history; and what in observation is loose and vague, is in information deceptive and treacherous. And if anyone thinks that this is a strange thing to say, and something like an unjust complaint, seeing that Aristotle, himself so great a man, and supported by the wealth of so great a king, has composed so accurate a history of animals; and that others with greater diligence, though less pretense, have made many additions; while others, again, have compiled copious histories and descriptions of metals, plants, and fossils; it seems that he does not rightly apprehend what it is that we are now about. For a natural history which is composed for its own sake is not like one that is collected to supply the understanding with information for the building up of philosophy. They differ in many ways, but especially in this; that the former contains the variety of natural species only, and not experiments of the mechanical arts...

"But then only will there be good ground of hope for the further advance of knowledge, when there shall be received and gathered together into natural history a variety of experiments, which are of no use in themselves, but simply serve to discover causes and axioms...

"Now experiments of this kind have one admirable property and condition; they never miss or fail. For since they are applied, not for the purpose of producing any particular effect, but only of discovering the natural cause of some effect, they answer the end especially well whichever way they turn out; for they settle the question...

"But even after such a store of natural history and experience as is required for the work of understanding, or of philosophy, shall be ready at hand, still the understanding is by no means competent to deal with it offhand and by memory alone...no course of invention can be satisfactory unless it be carried on in writing."

Bacon's was a grandiose scheme, formed while he was still young, for a Great Instauration or total renovation of the sciences. In 1605 he published the "Advancement of Learning," a classification and critical survey of all existing sciences, and in 1620, his greatest work, from which we have quoted the above aphorisms, the "Novum Organum," an exposition of the new experimental method. This new approach is the modern scientific method and the natural history of Bacon is the empirical (or experimental) science of today.

The effect of the scientific method was the stupendous advancement of learning which rushed forward in an ever increasing flood. It will suffice for us to mention by way of illustration, the names of the most notable scientists and dates of fundamentally important events in biology alone: VESALIUS (1542) founder of modern anatomy; HARVEY (1603) discovered circulation of the blood; Malpighi (1661) founder of pathology; discovered the capillaries in the lungs; founded modern embryology by a study of the incubation of the chick (1672); REDI (1668) disproved spontaneous generation of insects by discovery of eggs and larvae; wrote "Esperienze intorno alla Generazione degl'Insetti"; HALLER (1743) father of modern physiology; BUFFON (1749) first to obtain a clear inkling of geographical isolation, struggle for existence, artificial and natural selection; wrote "Histoire naturelle, generale et particuliere"; LINNAEUS (1753) founder of modern botany; classified plants; SPALLANZANI (1775) disproved spontaneous generation of bacteria and molds and demonstrated presence of living germs in the air; CUVIER (1800) founder of modern comparative anatomy; wrote "Le Regne Animal" 1800; BICHAT (1800) founder of modern histology; LAMARCK (1801) invented a scheme for the evolution of animals (by conscious effort and inheritance of acquired characters: not proved); TREVIRANUS (1801) introduced the name "biology" as distinguished from "botany," "zoology" "physiology," "anatomy," etc; MULLER (1833) founder of modern comparative physiology; wrote "Handbuch der Physiologie des Menschen"; SCHLEIDEN (1838) discovered the cell as the unit of structure in plants; SCHWANN (1838) discovered the cell as the unit of structure in animals; PASTEUR (1857) founder of bacteriology; studied fermentation; DARWIN (1858) reported his work upon the origin of species by natural selection and applied evolution to man; VIRCHOW (1858) worked out cellular pathology; founder of modern cellular pathology; SCHULTZE (1861) established the protoplasm doctrine; HUXLEY (1863) wrote "Evidence as to Man's Place in Nature"; MENDEL (1865) founder of modern genetics; discovered the law of heredity; GALTON (1875) studied inheritance; WEISMANN (1893) showed that germ-plasm and somatoplasm are distinct; ZITTEL (1893) wrote most important work on fossils; his "Handbook of Paleontology" is designated as a milepost in the development of that science; DEVRIES, CORRENS, TSCHERMAK (1900) all working independently rediscovered Mendel's law of heredity.

It is evident that although Bacon himself used the term "natural history" and its use has continued to the present day, when the sciences are now referred to, the practice is to designate them as the empirical or natural sciences.

While Webster recognizes that natural history formerly meant the natural sciences, he states it now commonly is restricted to a study of these subjects in a more or less unsystematic way. In this connection it is noted that the American Museum of Natural History is described in the Columbia Encyclopedia not as founded to promote natural history but to promote the study of natural sciences and related subjects. The 1943 edition of the Encyclopedia Americana, on the other hand, states "natural history" is commonly used to denote collectively the sciences of botany and zoology and is sometimes restricted to the science of zoology alone. The older encyclopedias such as La Grande Encyclopedie (Lamirault, Paris), Encyclopedia Universal Ilustrada (Espasa-Calpe, Madrid), Conversations-Lexikon (Brockhaus, Leipzig) and Lexikon (Meyers, Leipzig), in general identify natural history with biology, botany, mineralogy, geology and zoology.

The cataloguing of books on the subject of natural history in local libraries and the classification of publications in such reference books as the "Readers' Guide to Periodical Literature" and the "Essay and General Literature Index" strongly indicate the tendency to use natural history not as the collective designation of modern natural or empirical sciences but rather to designate the popular, juvenile, philosophic or poetic approach to nature.

Inasmuch as the phrase "nature study" appears to be firmly entrenched as the description of an education technique for the introduction of the teaching of science and vocational studies into the public schools, it would appear that natural history now designates an attitude toward nature rather than the practice of the scientific method as such. Dr. F. B. Loomis in the introduction to his "Field Book of Common Rocks and Minerals" expresses this popular attitude and gives legitimate meaning to the term natural history:

"Then too there is joy in going out into Nature's wild and raw places, joy in being on the foundations of the earth, joy in the scenery, in the beauty of the minerals themselves...

"Nature's book... has to be read closely, often between the lines. Until we are used to the characters in which the words are written, we read slowly."

Thus, it may be concluded that whereas formerly natural history was identical with the natural sciences, it no longer is confined to the strictly experimental scientific methodology. It has acquired a greater admixture of art and has evolved into a literary form in which the native inquisitiveness of man and his wonder and awe are expressed in the contemplation of a beautiful and infinitely complex universe. On its highest plane, natural history is no less than a modern naturalistic philosophy in which the richness and unlimited possibilities that belong to nature are, to the finite extent of which man is capable, felt, thought about and realized. Natural history means, then, not amateur science but the purposive literary or philosophic use of modern scientific materials and techniques. Natural history is the objectivity of empiricism conditioned by an emotional response to nature. Natural history is science-but it is also art.

NORTHWARD EXTENSION IN THE BREEDING RANGE OF THE BLACK VULTURE

by

Haven Kolb

The fact that the black vulture (*Coragyps atratus*) has sometimes wandered considerably northward from the region in which it nests led, in the nineteenth century to some uncertainty as to its true breeding range. Notwithstanding this confusion, it seems certain that the bird has actually been expanding its breeding range, at least along the Atlantic Coast. It is the purpose of this note to review briefly the evidence on this expansion and to report a further extension of about 45 miles beyond the previous recorded northern limit on the Atlantic seaboard.

Wilson (American Ornithology, Edinburgh, 1832, Vol.3, p.239) stated, "The carrion crow is seldom found on the Atlantic to the northward of Newbern, North Carolina." Audubon (Birds of America, 1840, Vol. 1, p.17) remarked, "Along the Atlantic coast it is, I believe, rarely seen farther east than Maryland." Neither of these early writers attempted to differentiate between the breeding range and the limits of wandering, but fifty years later Bendire (Life Histories, I, 1892, p. 165) said, "The breeding range of this Vulture may be defined as follows: On the Atlantic coast from southern North Carolina southward ..." and then went on to indicate that the bird did much wandering northward, even reaching Maine. When writing the first list of Maryland birds, Kirkwood (List of the Birds of Maryland, 1895, p.299) could give only one debatable sight record for this state. It would seem that during the nineteenth century there was little change in the breeding range of the



black vulture, or, if northward extension had begun, there were not enough observers at that time in the southeast to detect it.

The turn of the century, however, brought about a change in one, or both,

of these conditions. As early as 1913, Bailey (Birds of Virginia, 1913, pp. 100-101) mentioned that the bird was gradually extending its range northward, reporting that formerly it had seldom been seen north of the James but was then already breeding in Warwick County. Only ten years later breeding was discovered still farther north. Court (The Auk, 41:475-476, 1924) collected sets of eggs during 1922 and again in 1923 in St. Marys County, Maryland, and found adult birds numerous there. In 1929 Cooke (Birds of the Washington, D.C., Region, p.35), after giving a number of records of casual occurrence, stated that it was established as a breeding bird near La Plata, Maryland, which is in Charles County west of St. Marys and somewhat north of the localities mentioned by Court. A decade still later Wimsatt (The Auk, 56:181, 1939) found a nest in a rock crevice along the Potomac near Seneca, Montgomery County, Maryland. This is the farthest westward breeding record in Maryland, but recently the latitude has been about equaled by nestings near Bowie, Prince Georges County reported by Stewart and Robbins (The Auk, 64:268, 1947) and near Annapolis, Anne Arundel County, reported by Dorsey (Maryland, a Journ. Nat. Hist., 17:27-29, 1947).

On May 17, 1947, two members of the Natural History Society of Maryland, Mr. August Selckmann and Mr. Herbert Moorefield, accompanied by Mr. William Selckmann, were exploring Robert's Island, which is located in the Susquehanna River about five miles above Havre de Grace, Harford County, Maryland. About 10 a.m. they observed a black vulture perched on the chimney of an old, abandoned house. Knowing of several occasions when the species had been found nesting in abandoned buildings, Mr. August Selckmann thought it possible that the bird might be breeding and a search was begun. It was not until afternoon that the single egg was found laid on the ground in the midst of a tangled mass of boards and wrecked farm implements where an old barn had collapsed some fifty yards away from the house where the first bird had been observed.

When the nest was discovered the sitting bird flew off through the trees and perched on a lower branch where a view of the barn could be obtained. There it remained until the intruders had departed. A camera was set up to include most of the likely perches near the nest and the observers, with a release cord, retired to the kitchen of the old house. The bird flew directly back to the barn and perched on a projecting spar. The accompanying photograph was secured as it was about to drop back down to the nest. In subsequent photographic attempts the bird returned quickly to the nest, perhaps urged to do so by the intermittent rain which fell all during the day. When perched, it displayed a head lowering movement during which the wings were held loosely away from the body. On one occasion the observers got within thirty feet of the nest before the bird flushed.

Unfortunately it was not possible for the observers to return to this site, so the fate of this most northeasterly nesting by the black vulture is unknown. However, K.B. Corbett (Lancaster County Bird Club Bulletin, No. 12, pp. 2-3, 1947) reported a black vulture at Conowingo, about five miles up-river from Robert's Island on May 31, 1947. Not knowing of the Robert's Island nesting, he regarded the bird as a stray since others have been noticed in the region previously by members of the Lancaster County Club. In view of the demonstrated northward movement, observers in southeastern Pennsylvania should be alert to the actions of any black vultures observed in there in spring.

To the eastward of the Chesapeake, black vultures have not been often recorded. Stewart and Robbins (*loc. cit.*) report a local population at Wye Mills, (at a latitude roughly equivalent to that of Annapolis), and others farther south, but they make no mention of actual breeding records. Though most of the records which have extended the breeding range northward have been fairly close to tidewater, there is some evidence that the black vulture is also invading higher altitudes. Twenty years ago Dr. J. J. Murray (Bird-Lore, 30:116, 1928) reported the bird as common at Lexington, Rockbridge County, in the Great Valley of Virginia, where he thought they were breeding. He stated that at that time he had not seen any in the Valley north of Lexington. Now, however, Brooks (Checklist of West Virginia Birds, 1944, p. 17,) calls it a "permanent resident", which would imply breeding, in Jefferson County, West Virginia, near the north end of the Valley. Although he further states that it is found also in the eastern fringe of counties to the south where the elevations are much greater, the only definite breeding record at any considerable altitude in this region seems to be one reported by Murray on House Mountain, Virginia at 3000 feet (in Bent, Life Histories of North American Birds of Prey, Pt.I, 1937, p.33,).

NOTES ON THE ROCK DOVE IN BALTIMORE

by
Hervey Brackbill

Flocks of pigeons that have escaped from their owners and are living wild are familiar sights in both downtown and suburban Baltimore. Ornithologically, such birds are considered to have reverted to the status of rock dove (*Columba livia*), the European wild bird from which the domestic pigeon was developed. Since these birds not only maintain themselves in flocks the year around, but also nest successfully, it would seem that the species should be regarded as a member of our avifauna-and Hampe and Kolb do so regard it (Prelim. List Birds Md. and D.C., 1947:30), although a different view is taken by Stewart (Md. Birdlife, 3:56, 1947).

During some years that I lived at 3201 Carlisle Avenue, in northwest Baltimore-1933 to 1944-that neighborhood was continuously occupied by a flock of rock doves that usually numbered around a dozen. On one occasion I noticed a band on one bird's leg, showing that this was an escape; there was, of course, no way of telling whether the others were also direct escapes, or the progeny of such birds. The birds nested on the roofs of houses on Carlisle Avenue and Vickers Road, and were considered nuisances; occasionally a few were shot. Despite the breeding and the shooting, the size of the flock did not change appreciably from year to year.

Although I seldom watched these rock doves intensively, from 1938 on I did keep notes on such breeding behavior as I noticed, and made some observations at a couple of especially favorably located nests. As Hampe and Kolb (*op. cit.*) mention that data on the species are few, I present mine here.

Nests and building. I have records of building in five months: February to April, and September and December. Most of these records are for March and April. The one February date is the 20th, in 1939. The one September date is

the 11th, in 1938; two birds built that day; eggs had disappeared from a previous nest of one of these birds just a few days before. The one December date was the 25th, in 1937, which fell during mild weather.

Some of the houses in the Carlisle-Vickers neighborhood are rather small two-story ones; the roofs slant down front and back, and broad gables project from them. The angle between the house roof and the overhang of the gable at each side was the rock doves' favorite nesting place; sometimes two, and I believe even three, pairs of birds would nest simultaneously in the different nooks on a single roof. Another nest that I saw, however, was built under no shelter whatever, on the nearly flat roof of a one-story back porch. Still another was built in the screened funnel of a rainspout at the top of the second story of my own home.

The materials used were almost always twigs, ranging in length up to about 18 inches; occasionally a dead leaf or dead grass stem was used. These materials were always gathered from the loose litter on the ground in the vicinity; once I saw a bird pull at live stems of ground-growing ivy, but it did not succeed in breaking any off. In gathering the material, the birds showed selectivity, often picking up a twig, leaf or grass stem, then dropping it as if it had proved to be unsatisfactory, and searching about for another. Sometimes birds took twigs from abandoned nests, and sometimes even from nests that other rock doves were building or using.

The nests were bulky and somewhat sloppy; because of the pitch of the roofs, twigs often slid away from the mass and littered the roofs for several feet below.

I seldom knew the sex of the building birds. In one instance, however, just after the disappearance of one set of eggs it was the female that was doing new building. In another instance, I saw a male work on a nest that was not the one used; several weeks later, both members of this pair added material to the nest that was being used-it then held eggs or young.

Copulation. I have records of copulation, or moves to copulate, in seven different months: January to May, and August and September. Most of these records, too, however, are for March and April. The one January date, the 8th, in 1939, fell during a warm spell. On the two February dates, the 6th in 1938 and the 21st in 1943, copulation was not actually completed; one bird mounted another, but then merely dismounted again. The one September occasion, on the 7th in 1938, came just a few hours after one set of these birds' eggs had disappeared.

On April 21, 1938, and August 24, 1940, birds mounted each other in turn and copulated (Auk, 58:581, 1941).

Clutch. Two nests that I could see into held two eggs; another nest held one egg.

Incubation. At two nests that I watched at some length, both members of the pair incubated the eggs. At each, it was the female that spent the night on them. At one, the male would relieve his mate between 10 a.m. and noon and sit

until she returned, between 4:15 and 5:45 p.m. At the other, the birds alternated on the eggs in the daytime, in very irregular periods. At a third nest the female seemed to do all of the sitting.

Feeding of young. On the only occasion on which I could tell the sex, it was the female that made a feeding of nestlings.

Nesting success. Of three nests that I was able to watch, only one was successful, producing two young; the eggs mysteriously disappeared from the other two nests. On another occasion I saw a partly grown squab from some other nest being fed.

Brief histories of the first three nests are:

September 3, 1938, nest with 2 eggs discovered on back porch roof at 3205 Carlisle Avenue. Those eggs were incubated, apparently by female alone, until September 7th. At 7:15 a.m. that day, the female was sitting; at 9:12 a.m. the eggs and bird were gone; at 2:30 p.m. another rock dove copulated with that female near the nest. On September 11th, that female and another bird were carrying twigs from that old nest, and from the roof about it, each to a different place.

May 27, 1939, nest with one egg discovered in rainspout funnel at 3201 Carlisle Avenue. That egg incubated by both members of pair until June 4th. At 9 a.m. that day the male was sitting; at 9:52 the egg was gone and the nest deserted.

April 2, 1944, male working on nest on roof of 3203 Carlisle Avenue; female using a different nest 3 feet away under gable overhang. April 3rd, copulation. May 14th, an egg glimpsed in nest; May 16th, two eggs seen; laying dates unknown. May 29th, two small young seen. June 11th, nest destroyed by householders, but squabs, now larger than chicken peeps, elude capture.

Downtown birds. Downtown breeding was reported to me in the summer of 1948 by employees at the Pennsylvania Railroad Station. Rock doves regularly frequent that place, and the employees said they had heard the cries of squabs from the top of one of the piers of the St. Paul Street bridge nearby. The presence of adult birds and considerable "whitewash" there made the report plausible.

NOTES FROM FIELD AND LABORATORY

A CASE OF PARTIAL ALBINISM IN THE SHORT-TAILED SHREW

During the course of the last nine years, five references have appeared in the Journal of Mammalogy regarding albinism in the short-tailed shrew (*Blarina brevicauda*). Recently, Mr. John A. Childs of Baltimore presented the Natural History Society of Maryland with a specimen which shows a partial albinistic pattern. The specimen, taken in Towson, Baltimore County, Maryland, is probably a female, but this was not positively ascertained. The entire head is normally colored except for a narrow longitudinal stripe on the chin and throat. The entire thorax is white, including the fur on the forefeet, and the white extends backward well on the abdomen. The remainder of the ventral parts and hind feet are normally colored except for a white patch in the right in-

guinal region connecting with the white portions of the back. Dorsally the normal coloration of the head extends medially for a short distance backward into the large white area. The white area continues to form a complete band around the animal. The remainder of the dorsal surface is normally colored except for a large white patch on the right loin connecting with the white patch of the inguinal region, mentioned above. The tail and eyes showed no lack of pigment.

Ulmer, (Jour. Mamm. Vol. 21, pp.89-90) describes an adult female having a white area covering the abdomen, hips, and legs, with a tail tipped with white hairs. Christian, (Jour. Mamm. Vol. 28, p.403) mentions three mildly spotted specimens: one, having two small white spots on the venter; one having a white bar on the left side; the third having a white band on the tail. Other specimens previously described were entirely white or cream colored.

Joseph Gentile

RED CROSSBILL OBSERVATIONS IN MARYLAND IN 1941

Unusual numbers of red crossbills (*loxia curvirostra*) were reported in the northern states in late winter of 1941 and some remained as late as early May in lower New York, Pennsylvania, and Ohio. Only one Maryland record (Hampe, 1942, Bul. of Nat. Hist. Soc. of Md., No. 5, p. 75) is available for this period.

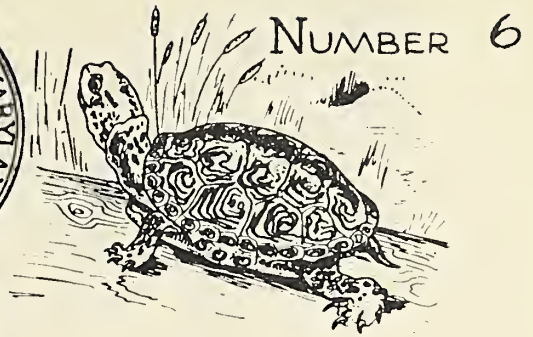
On April 2, 1941, the writer observed two red crossbills digging seeds out of pine cones on the grounds of the Bureau of Entomology and Plant Quarantine at the Agricultural Research Center, Beltsville, Maryland (Prince Georges County). This observation led to additional records at the same location as follows: April 3, a dozen seen in pines and several were in song; April 16, twenty were seen in one group and later a flock of thirty was seen; April 17, a flock of forty-three birds was feeding together on pine cones; April 22, two seen in flight; April 29, a group of about a dozen was seen; May 3, a small flock flew overhead; May 5, three seen in pines and others heard. On this date beneath some pines a dead adult male was found. May 7, twelve were counted in one flock and others were heard; May 8, a small group was seen; May 12, three birds were observed together; May 15, two or three were noted together in pines for the last record.

John H. Fales

VESUVIANITE FROM THE CAMPBELL QUARRY, TEXAS, MARYLAND

A single crystal of vesuvianite was collected recently from the Cockeysville marble at the Campbell Quarry, just west of Texas, Baltimore County. Vesuvianite is a basic calcium aluminum orthosilicate and is characteristic of crystalline limestones and other metamorphic rocks, such as schist and gneiss. The crystal was a short, striated prism, terminated by a low pyramid, brownish-green in color with a vitreous luster. It measured 11 by 2 mm, and was associated with phlogopite in the white, coarsely crystalline marble.

Joseph F. Schreiber, Jr.

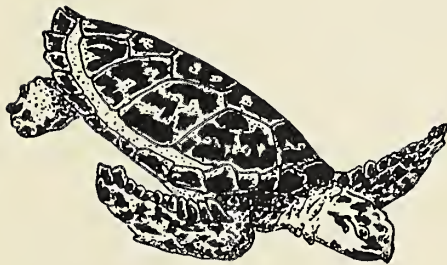


MARYLAND NATURE LEAFLET

MARYLAND TURTLES

by

John E. Norman



HAWKBILL TURTLE

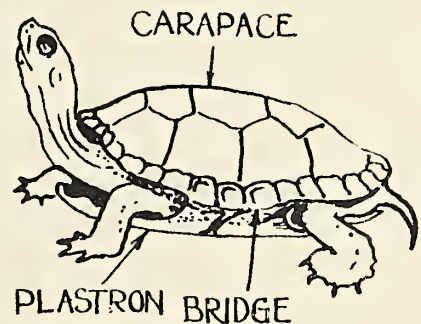
Do you remember the story of the tortoise and the hare? Old Slow-and-Sure, the tortoise, won the race by plodding steadily along while the flashy hare took a nap. To the tortoises and turtles this is an old story. For almost two hundred million years they have shuffled around our earth. New forms of life have appeared, run a fast race, and disappeared forever, but these old armored reptiles still crawl about our Maryland creeks in the same old slow-and-sure way. "We have seen them come and we have seen them go", the turtles can truly say.

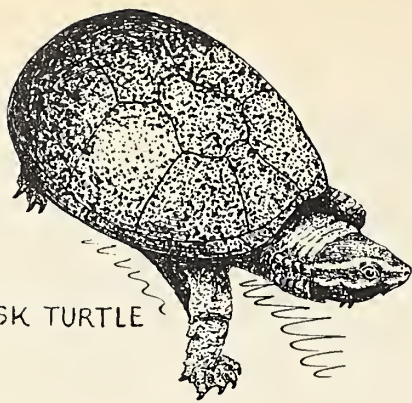
Few animals have changed so little in such a long period of time. The turtles that roamed over

the world of many millions of years ago were much like the turtles of today. They took out their patent long ago and there have been few changes in the model since. Turtles are unlike any other animals in that their ribs are on the outside of their bodies. These ribs have broadened and grown together until they form a bony shell which is covered by leathery shields or plates. The shell is composed of two parts, the upper (called the *carapace*) and the lower (called the *plastron*), which are joined together along the side by a *bridge*. The protection which this bony "house"

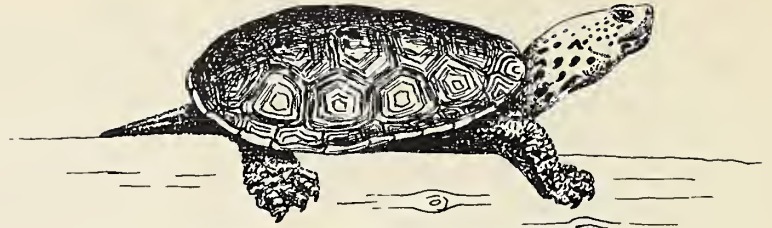
gives to the turtles has made it possible for these animals to survive conditions which have killed off many less well-equipped animals.

Turtles are reptiles and so they share some characteristics with the other reptiles such as the snakes, lizards, and alligators. All reptiles are "cold-blooded", which means that the temperature of their bodies changes as the temperature of the air or water around them changes. Because of this fact the turtles must hibernate in the winter time, hiding themselves in places where the temperature will not go below freezing. Unlike young birds and mammals young reptiles receive no care from their parents. No turtle ever knows its mother, for the female turtle, after laying her eggs in the ground and covering them over with earth, goes on about her business. The eggs are left to be hatched by the warmth of the sun.





MUSK TURTLE



DIAMONDBACK TERRAPIN

Most herpetologists (the scientists who study reptiles) agree on calling those species which live entirely on land by the name of *tortoise*, those which live in fresh water all or most of the time *terrapin* and only those that live entirely in the ocean *turtle*. Many people get these terms mixed up, so in a general way we can refer to all these animals as turtles.

In the world today there are about 250 living species of turtles. Maryland does not have a very large share of this number. There are five sea turtles which may visit our short coastline occasionally.

The hawksbill, shown in our illustration, is a good example of them. Since these visits are mostly accidental, we shall say no more about the sea turtles in this leaflet. The rest of our turtles make just an even dozen, a group large enough for variety and small enough to be easy to learn.

Almost everyone who has taken walks in the Maryland countryside has seen at one time or another a box turtle lumbering along almost at a snail's pace. In spite of its slowness the box turtle has been able to survive on land because of the excellent protection of its shell. While all turtles can withdraw into their shells to a certain degree, the box turtle is the only one in Maryland which can completely enclose itself. It can do this because its plastron has a hinge which makes it movable. The markings on the shell are very variable but are usually yellow on a more or less brown background. In general females have brown eyes and males have red ones. The box turtle will eat almost anything and for this reason it makes a good pet. Although at first it will close itself up whenever it is disturbed, it will soon become tame and may even eat from the hand of its owner. While this species spends most of its life on land, it is not a true land tortoise and at times can swim well. It may live to a very old age if the dangerous days of youth are safely passed.

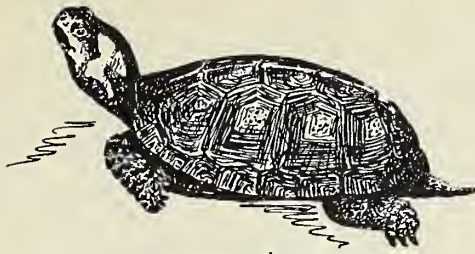
The snapping turtle is the largest fresh-water turtle found in Maryland. A large adult may weigh 15 to 30 pounds. It can be recognized by its large head and long tail. Most of its time is spent lying on the muddy bottom of some pond or river where its plain brown shell, often covered with small green plants, conceals it from its prey. Although the snapper lives mainly on fish, it will grab with its powerful beak any animal in the water small enough for



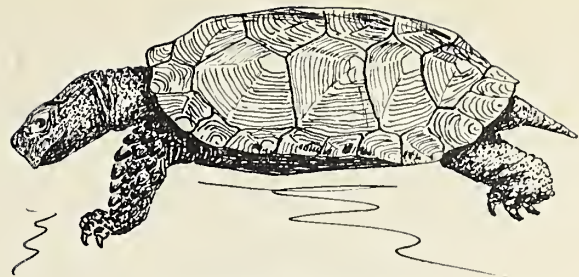
BOX TURTLE



SNAPPING TURTLE



MUHLENBERG'S TURTLE



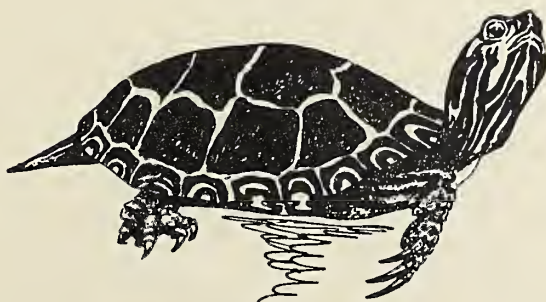
WOOD TURTLE

it to handle, such as young ducks or muskrats. Therefore, the snapper is not popular with fishermen, hunters, and trappers, for it eats what these men want for themselves. On the other hand, the flesh of the snapping turtle is very fine and some snappers are caught and sold for food. In the kitchen, however, it cannot rival the fame of the diamondback terrapin.

While the country boy in Maryland may know best the snapper and the box turtle, lovers of fine foods throughout the world know the delicious Chesapeake diamondback. Once this terrapin was abundant throughout the region of our great Chesapeake Bay, but so popular did it become as a food in hotels and fine restaurants that there was danger that it would be completely destroyed. At last laws were made for its protection during parts of the year and now the "Chesapeake", as it is sometimes called, is again increasing in numbers. Sometimes the yellow-bellied and red-bellied terrapins (not illustrated), somewhat larger than the diamondback but not as fine-tasting, are used in place of the diamondback. The yellow-bellied terrapin is very rare in our state. The red-bellied is rather common on the Eastern Shore. So famous is the real diamondback that the University of Maryland uses it as a symbol and has named one of its publications after this reptile.

While walking along the bank of some pond or lake on a bright, warm summer day you may have noticed a group of turtles basking on a log or rock. Up they scramble from the water, climbing over each other to get into the sunshine. They lie motionless enjoying the warm rays until along you come; then off they slide or tumble into the water and disappear. One of the most common turtles in the state is this familiar dweller of fresh water, the painted turtle. Living up to its name, this is one of the most beautiful turtles in the world. The yellow plastron and the rich olive carapace form a contrast to the brilliant red and black markings along the bridge and carapace rim. It is a difficult turtle to capture for it is always alert and an excellent swimmer. The painted turtle adds a great deal to the attractiveness of our ponds and larger streams.

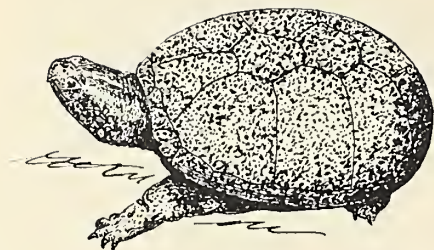
The spotted turtle is often found with its painted cousin, sunning itself on a log. It is a duller animal with a dark brown or black carapace spotted with bright yellow. You can approach this turtle much more easily than the painted



PAINTED TURTLE



SPOTTED TURTLE



MUD TURTLE

for it is not as shy. Its food is chiefly water insects and so it may be of some economic importance.

The rough, carved shell and the orange or reddish legs identify the wood turtle. Although it is closely related to the spotted turtle, the wood turtle has quite different habits. As its name shows, it spends much of its time on land, where it wanders about searching for food. Like the box turtle, it enjoys a wide selection of foods, eating many kinds of animal and

plant material. Adults may have a shell length of eight inches, while the spotted turtle is seldom over five inches long. Look especially for the wood turtle in the mountain region of Washington, Allegany, and Garrett Counties; look for the little spotted turtle in the eastern part of the state. Wood turtles are easily tamed and make very good pets, showing rather more "intelligence" than other turtles.

Another close relative of the spotted turtle has been found in Maryland only three times. It is Muhlenberg's turtle, named after an early American naturalist, but sometimes called the orange-eared turtle because of the two bright patches of orange on the neck. You might look for this smallest of our turtles in Cecil, Harford, and northern Baltimore Counties. If you should find what you think is a Muhlenberg's turtle, be sure to let us know.

The map turtle (not illustrated) has been found a number of times in Maryland, but only in the region along the Susquehanna River. It is a large turtle which is sometimes caught by fishermen with hook and line.

Turtles do not draw much attention to themselves, so even those that are abundant are often overlooked by most people. The musk turtle and the mud turtle belong to this group. Their dark brown color helps to hide them, but in addition their habits keep them out of the notice of all except those persons who are looking for them. Most of their time is spent in poking around the muddy bottoms of ponds and slow-moving streams. Both have scent glands which they use when handled. The odor is especially strong in the musk turtle, and because of it the musk turtle has earned the not very pretty name of stink-pot.

So we see that at least one Maryland turtle is of value as food and one is perhaps damaging to fisheries, while the great majority do not affect man much either for good or for bad. But the turtles have a great importance in giving us a glimpse of the life of long ago. They have come down to us through millions and millions of years. Don't you think they should be allowed to go on living their slow and quiet way in the years to come?

DRAWINGS BY WILLIAM NORMAN.

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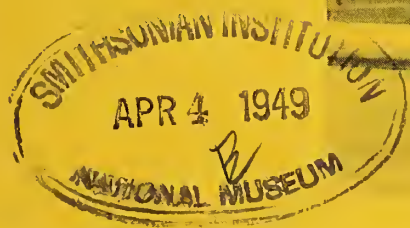
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MARYLAND NATURALIST

The Natural History Society of Maryland

SPRING 1949

VOLUME XIX No. 2



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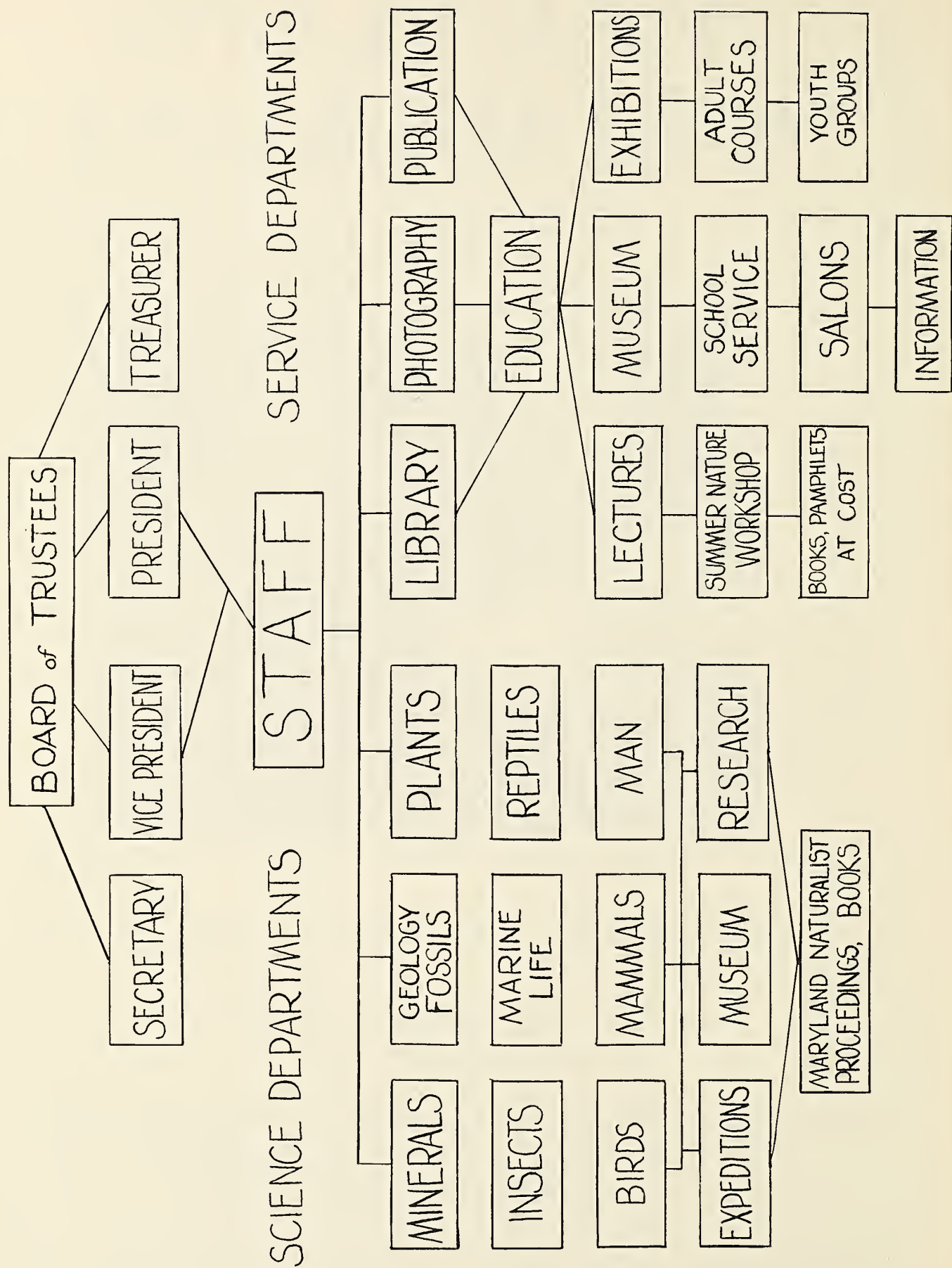
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ORGANIZATION of the NATURAL HISTORY SOCIETY of MARYLAND



THE NATURAL HISTORY SOCIETY OF MARYLAND - TWENTY YEARS OF PROGRESS

by

EDMUND B. FLADUNG, PRESIDENT

INTRODUCTION

At the time of the founding of this Society and for some years prior thereto, very little interest had been shown in the natural history of our State. The literature was very scanty - publications of the Geological Survey, a volume of Transactions of the Maryland Academy of Sciences, a few pamphlets and some material in periodicals, mostly of early date, were about all extant regarding the animals, plants and geology of our State. The Maryland Geological Survey's volumes on geology and paleontology were probably the most outstanding publications.

At that time there was but one institution available for the pursuit of natural history and its work was being directed toward other fields of science.

The writer and his friends, for many years interested in the natural sciences, having accumulated much information on the subject, felt that there should be an institution in Maryland solely devoted to the natural history of our State; and this institution should make every effort to interest and enlighten our citizens concerning this subject, to make them conscious of the rich heritage they possess, to aid in the much needed conservation of our State's natural resources, to create research facilities for those desiring to aid in disseminating this knowledge among our people, and finally, to build a museum of natural history comparable to those in other cities, in which to house and display Maryland Nature for the benefit of its citizens.

HISTORY

On Maryland Day, March 25, 1929, W. Wallace Coleman, Edmund B. Fladung, Sidney Garman, F. Stansbury Haydon, Gilbert C. Klingel, Herbert C. Moore, Eugene R. Pollock, and Alvin D. Zachary met at the office of Mr. Haydon and organized the Natural History Society of Maryland. On April 14, 1929 the organization was incorporated under the laws of the State of Maryland, for the following purposes: "to increase and diffuse knowledge of Natural History and to that end to establish and maintain in the State of Maryland a museum and reference library, to protect wild life from needless destruction, to provide facilities for research and publication, the pursuance of allied sciences and endeavors, and to offer popular instruction".

The Society took over Mr. Haydon's quarters at 605 St. Paul Street, Baltimore, located above a garage in the rear of the building. There were 125 square feet of floor space partitioned into three rooms, the largest serving for lectures, meetings and exhibitions, a smaller room as library and office, and another small room as laboratory, cloak and storage room.

The organization was headed by seven trustees, who elected a President, Vice-President, Secretary, and Treasurer. There were five departments:

geology, insects, reptiles, birds, and the library. At the end of the first year there were 23 members.

From this beginning the new institution started its research, publication and public educational work. After five years the Society found itself so crowded that larger quarters had to be secured. There were now 92 members on the rolls, with a staff of 35 workers in 10 departments. The departments embraced the fields of minerals, fossils, plants, marine life, insects, reptiles, birds and mammals, archaeology, education, and publication. On February 4, 1935 the Society moved to its second home, 2103 Bolton Street, which was rented from the Pennsylvania Railroad. This move gave us a fifteen room building with much additional floor space, which at the time, but not for long, seemed adequate for our expanding organization.

Shortly after this expansion the dream of a public museum was realized. The old Maryland House, which had served as a museum since the Philadelphia Centennial (1876) was taken over by the Society, under an arrangement with the Park Board. Here in Druid Hill Park, Baltimore, we proceeded to make the old museum as modern as possible within the compass of our limited means. About this time the Natural History Society was granted its first financial aid from the City of Baltimore. This support which has been increased somewhat through the years, together with the dues and contributions of its members and friends, constitute the financial basis for the work of our organization.

By the end of its ninth year (March 31, 1938) 186 members were enrolled in the Society. Two more departments had been added, photography and the museum, making in all 13 departments with a staff of 49 men. To keep pace with this growth the Constitution was changed, increasing the Board of Trustees from 7 to 9 members. The educational program was ever-growing and each year new exhibits were displayed in the museum, and new publications were made available to our citizens. More space was needed for departmental activities. Progress continued under crowded conditions.

However, in 1941 and 1942 the war began to cause considerable retardation in the Society's work, and as the tempo of the War increased, more and more of our men left for the Armed Forces. In all, during the conflict 93 members served in the Army, Navy, Marine Corps, Air Force and Merchant Marine, 25 of these being members of the Society's departmental staff. Other staff members were giving instruction and lectures on first aid and air defense. Naturally there was a great curtailment of our educational program and of our research.

In March, 1942, the Pennsylvania Railroad offered for sale the property occupied by the Society and also the building adjacent thereto. This presented a great opportunity to the institution - a permanent home. Through the generosity of Mr. and Mrs. Aaron Straus and our members, the Society purchased both 2101 and 2103 Bolton Street on August 23, 1942. During the critical housing period the corner building was occupied by tenants, but in 1945 and 1946, with the return of our men, the additional building space was needed. Our collections and library had increased to such an extent that extra storage room was essential. Laboratories were small and sometimes two departments had to share the same room. It was therefore fortunate that we had also acquired the corner building, into which we expanded in 1946.

On our 18th Anniversary, March 31, 1947, we had a membership of 303 persons, with a staff of 48 working in 13 departments. The Constitution was again changed, increasing the Board of Trustees to 13 members. In making this change the Trustees felt that with the growth of the Society the Board should be of sufficient size to allow a truly representative governing body of professional and business men.

On our 20th Anniversary the membership is approaching the 400 mark.

PROGRAM

The program of the Natural History Society of Maryland is a large and varied one. It not only embraces research and publication of original findings and popularized knowledge through its Journal "Maryland Naturalist", its proceedings, books, pamphlets and nature leaflets, but also provides its members and our citizens with exhibits of Maryland nature through its museum, with lectures and courses, and photographic displays. Facilities for the instruction of boys and girls are maintained, and special efforts made to stimulate their interest. This program was inaugurated at the very beginning of the Society and has been developed and expanded each year.

Research

Much could be written about the research conducted by the twelve departments of the Society, but it is sufficient to say that some form of research is conducted in almost every branch of natural history. Moreover, this research ties in with the Society's program for both adults and children. Our departments have built up Maryland collections in geology, botany, zoology, and archaeology that would do credit to a much larger institution. To assemble this material it has been necessary to organize field trips and expeditions over our entire State. These trips and expeditions have covered a period of one day to four weeks. Almost every portion of the State has been visited at one time or another, and some many times, according to the requirements of the studies at hand.

But our efforts have not been entirely local, for expeditions have been conducted to Haiti, Santo Domingo, Inagua, Cuba, and many of the States and Provinces of North America.

Publications

Publication by the Society was first started with the report of its research work. Our Journal, "Maryland Naturalist", now in its 19th volume, began as a four-page publication, $5\frac{1}{2} \times 8\frac{1}{2}$, known as the "Bulletin", a monthly. This publication has gone through an evolution from a single folded mimeographed leaf, to the present $8\frac{1}{2} \times 11$ illustrated planographed journal. Its name has also been changed from "Bulletin", to "Maryland", to the present "Maryland Naturalist". This journal is now to be found in over 75 libraries and other institutions throughout the State.

Another serial, appearing at irregular intervals and entitled "Proceedings of the Natural History Society of Maryland", has reached ten numbers. These proceedings pertain to specialized work dealing with various phases of natural history. The most important are our archaeological and herpetological papers. Though mimeographed, they have been so well received that only the more recent, those dealing with Maryland archaeology, are now obtainable.

The Society has also published within its 20 year history five books and four pamphlets. The largest undertaking in this field was the "Snakes of Maryland" which was chiefly written and principally financed by Dr. Howard A. Kelly. Not only this publication but most of the other earlier pamphlets published by the Society received financial support from Dr. Kelly. Subjects treated in these books and pamphlets have been snakes, birds, minerals, spiders, trees, and several groups of insects. These publications have been circulated throughout all parts of Maryland and in many parts of the United States, and have been exchanged with a number of foreign institutions.

The latest publishing venture of the Society has been a series of Nature Leaflets, seven of which have been issued to date. These leaflets are chiefly intended for school children, but are of equal interest to adults. They will fill a gap in classroom literature so necessary for work among young people. The leaflets cover a wide field, and eventually they will be issued on all branches of nature.

Another publication of the Society is its annual report which was issued for the first ten years, and then discontinued for a period of six years because of war conditions. The report was resumed at the end of the year 1947.

Lectures and Courses

Our lecture program has been very extensive. In addition to special staff lectures, public lectures are held in the Fall, Winter and Spring. Many prominent scientists from our Universities and the National Museum have spoken before our membership and guests. Our lecture program is as old as the Society.

At irregular intervals the Society has conducted courses for its members and for anyone interested in learning more about the natural sciences. These have included the study of minerals, geology, birds, insects, and photography.

The First Maryland Salon of Natural Science Photography was an innovation in 1948 open to all photographers. The Society has had a number of photography exhibits in past years, but all of these former exhibits were limited to our membership. The new venture into a wider field was a great success. The pictures dealing with plants and animals were taken to the National Museum in Washington for a month following the Baltimore show. Entries came from fourteen States, the District of Columbia, Canada, Hungary, and Italy. One hundred and eleven prints were exhibited. The Salon attracted wide attention and we had several requests to exhibit the photographs elsewhere.

Education

The children's program has been of much concern to the Society, and much effort has been expended in this direction. The Society, in its infancy, started a section for boys and girls known as the Junior Division - still a most important part of the organization. All boys and girls from twelve years of age up to eighteen are admitted. Every Saturday evening they assemble at the Junior Division meeting to hear a lecture by one of our Staff members or to participate in other phases of the Junior program. These lectures are brought to the level of children. The boys and girls themselves also give talks at their meetings. This is done to enable them to acquire the art of public speaking. Motion pictures, nature quizzes, and debates are likewise a part of the varied program. Once each year an exhibit called a Nature Fair is held, featuring special projects on which the young people are working. Certificates and prizes are awarded to stimulate interest and to promote competition.

A free Summer Nature Work Shop is conducted every year. This is open to children and young people from eight to eighteen years of age. Courses are conducted for the study of birds, reptiles, insects, plants, minerals, and nature drawing. The students are taken on periodic walks where animals and plants in their natural environment are found. At the expiration of the courses, exercises are held to which the parents are invited and at which certificates and prizes are awarded to the children.

From its inception the Society has endeavored to aid our schools in the teaching of natural history and biology by the loan of specimens. This school service consists of a series of mounted birds, mammals, insects, woods, and minerals. This is one of the most costly services rendered by the Society as there is a constant replacement and upkeep necessary.

Museum

As mentioned in the early part of this article, in the spring of 1936 the Society opened to the public of Baltimore, its Museum of Natural History in Druid Hill Park, in accordance with an arrangement with the Park Board.

Much time and effort were spent by the Society to make a Museum along lines as modern as possible with the limited means available. Since then new material has been added from time to time, finances permitting. Our Museum though very deficient in many ways, even when compared to Museums in cities much smaller than Baltimore, is the only Natural History Museum in our City. During the Spring, Summer and Fall crowds of people visit the Museum, and it is approximated that over a period of years the attendance averaged 60,500 persons per year.

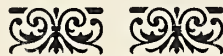
We have tried to depict Maryland Wild Life in its many forms, to construct synoptic exhibits that tell a story of interest to the general public, and to make clear displays showing wild life as it would appear in natural habitats. Much could be done if our resources were larger, but we feel that this small Museum in Baltimore is one which our citizens can enjoy.

CONCLUSION

Our future seems bright, though we labor under many difficulties. There are many things we could do with additional finances.

We feel that we have done a fine job these past twenty years, especially when one considers that it was done voluntarily, and without remuneration, by our staff. We are appreciative of the backing of our entire membership, which has aided with dues and contributions; we are pleased that the City of Baltimore has recognized our institution as an integral part of the cultural life of our City and is cooperating with us in our efforts; we must add that without the aid of Mr. and Mrs. Aaron Straus and the late Dr. Howard Kelly our limitations would have been far greater.

We are a non-profit institution, organized to fulfill a cultural need in our great State of Maryland and City of Baltimore - we invite the cooperation of those interested in natural history to aid us in making the next 20 years even more successful than those we are now happily commemorating.



AARON STRAUS

Aaron Straus, Trustee and Patron of this Society, has been especially instrumental in aiding the Society in securing its present buildings. It is through the generosity of men like Mr. Straus that our Society has been able to attain a measure of stability and success.

Mr. Straus is well known for his interests in civic, educational, philanthropic and cultural activities. Chief among his interests has been work with young people. Baltimoreans are particularly proud of him because he has always been one of them - he was born in Baltimore City, attended our public schools and later reached an outstanding position here in the business world.

Both Mr. Straus and his wife, Mrs. Lillie Straus, have encouraged the Trustees and Officers of the Society in their endeavor to build up a worthwhile institution in the City of Baltimore and the State of Maryland.



Fabian Bachrach

AARON STRAUS

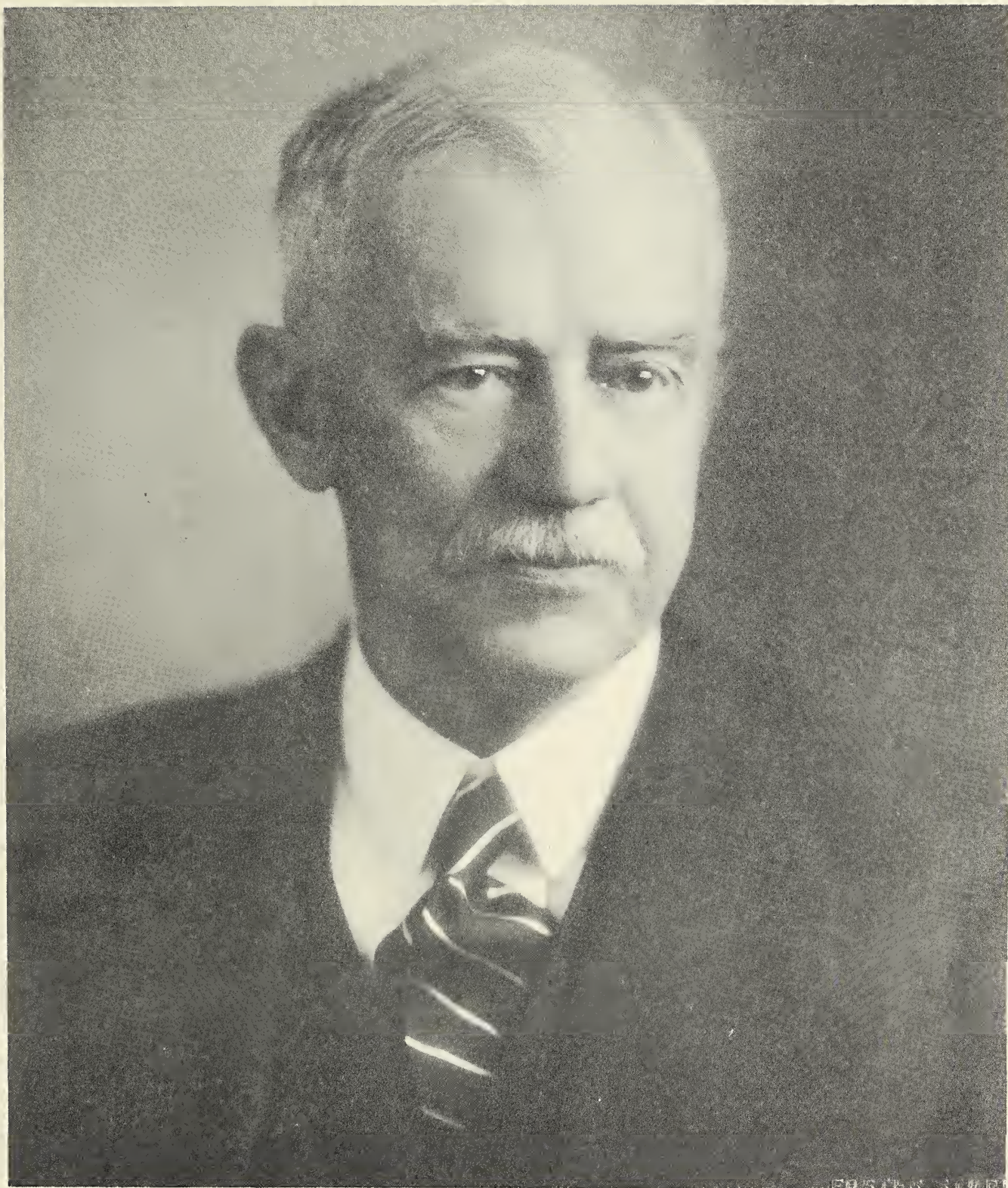
HOWARD A. KELLY, NATURALIST (1858-1943)

By
EDMUND B. KELLY*

As the Natural History Society of Maryland celebrates its twentieth anniversary many of the older members will call to mind the memory of one who took a keen and lively interest in all the activities of the Society. Likewise it can be said that no one would rejoice more in our present growth and prosperity than Doctor Howard A. Kelly, who was an active and enthusiastic participant in the Society from its inception until his death six years ago.

Howard A. Kelly was born on February 20, 1858, in Camden, New Jersey, where his father, a Captain in the Union army, happened to be stationed at that time. However, all his ancestral ties were with the nearby city of Philadelphia where his family on both sides had lived for several generations, having come there from Vermont in colonial days. He was a direct descendant of Michael Hillegas, the first Treasurer of the United States. After the close of the Civil War the family lived in what is now downtown Philadelphia, where he attended Dr. Faires' Classical Institute, a private school for boys, under the supervision of a scholarly old master who followed the discipline of the English, rather than the American, schools of the day. Some years before his death Doctor Kelly wrote a delightful account of his reminiscences of Dr. Faires' classroom, with quite understandable emphasis on the doctor's collection of birch canes. With warmer weather the family would move to the country near to where the city of Chester now stands and here at an early age first became manifest the young boy's interest in various sciences, in those days all loosely grouped under the name of Natural History. There were no doctors of medicine or other scientific men in his immediate ancestry, which was largely comprised of men concerned with the ministry or in business and his scientific tastes seem to have arisen spontaneously. The study of nature attracted him from the first and among his earliest memories was the horri-fication of his mother when he returned from an expedition to the fields with a squirming collection of turtles and snakes. The clothing of those times did not provide adequate pockets for an acquisitive boy and young Kelly solved this problem by buckling his knickers tightly at the knee and filling the space between skin and trouser-leg with his captives. Everyone expected him to succumb to some terrible skin poisoning but he seems to have survived without mishap. Insects, reptiles and all small nuisances were generally referred to as "bugs" and young Kelly early declared "bugology" his paramount interest. His ardent hope was to discover some new species and he was greatly worried that all might be found and described before he could get into the field. Doctor John Le Conte, the great coleopterist of the Philadelphia Academy of Natural Sciences, who was visiting the family in Chester about that time, assured him that some would be left for the next generation.

**Dr. Edmund B. Kelly, a Trustee of the Natural History Society of Maryland, was requested by the Editorial Staff to write this account of his eminent father.*



To the Natural History Society Howard A. Kelly
July 1935

Coming into adolescence the young man became a persistent visitor at the Academy and took an increasing interest in all its exhibitions and activities, particularly in the field of botany which he thought to make his life's work. This led to an interesting event which first gave impetus to his love of venturing among forests and rivers later in life. About 1875 Doctor Rockroth, a citizen of Philadelphia, in order to study the flora of that region, included him among a group of young men he took on a short camping trip to the Loyalsock River. Not far from the present city of Williamsport, it was the heart of the lumbering country in those days. The founder, having lost interest after the first trip, young Kelly and an associate took over the enterprise the next summer on a more permanent and extended basis. As far as records show, this camp was the progenitor of all the innumerable Boys' Camps of subsequent years. Two years later we find young Kelly venturing as far north as Bracebridge, Ontario, then the westernmost extension of the Canadian transcontinental railway. At nearby Orillia he excavated and brought home seventy-five Indian skulls from a battlefield of the great explorer, Champlain, on his farthest foray northward.

In 1877 he entered the medical department of the University of Pennsylvania, not because he was primarily interested in medicine as such but because anatomy and sundry associated scientific studies seemed the closest approach to natural history, in which it was hard to make a living. Here he was in close contact with the great naturalist, Edward Drinker Cope, whom he had known for many years as a teacher and patron through his interest in the reptile kingdom. His medical course had to be interrupted for a year because of failing health from confining work, and young Kelly spent the year 1880-1881 in Colorado as a cowboy, a circumstance which afforded him many opportunities to make observations in the field of nature as well as to practice a limited form of medicine somewhat prematurely. The vast domains of geology, paleontology, and mineralogy were opened up to him and he pursued his studies and collections in these fields the rest of his life. In his later years he frequently returned to Colorado and Utah, particularly the region of the great canyons, and in his seventieth year actually organized and equipped an expedition for the descent of the Colorado River, including the Grand Canyon. The enterprise had to be abandoned because of the unfavorable flood conditions of that year.

Going still farther afield during the nineties, Doctor Kelly and his boon companion, Doctor Brice W. Goldsborough, made several extended trips on horseback through the wilderness of the Mexican state of Oaxaca and finally engaged in a large silver-mining venture, buying up the mining rights in an area as large as a Maryland county. The young scientist seems to have expended more effort in the study of the local Indians and the mineralogy of the territory than in the affairs of business as the enterprise ended disastrously from the financial point of view. However, he brought back many fine specimens from nature and relics of the ancient Aztec culture. This collection, donated to the Hopkins, contains some of the finest Aztec idols yet recovered.

In the meantime he had taken his medical degree at the University of Pennsylvania in 1882 and thereafter quickly established his reputation as a brilliant young surgeon, ultimately leading to a call to Baltimore in 1889

to join the faculty of the newly forming Johns Hopkins Medical School. He became the first Professor of Gynecology and Obstetrics and retained the former professorship until his retirement in 1919 to the status of Professor Emeritus. The discovery of antiseptics and anesthesia in the seventies opened up the various fields of surgery with the explosive effect of a bomb and with the subsequent rapid development of heretofore impossible operations and techniques, Doctor Kelly became the father of modern gynecological surgery. His name is associated with those of Doctor William Welch, Doctor William Halstead, and Sir William Osler as the "Big Four" of the Johns Hopkins Medical School, a happy association which gave rise to the first of the modern medical schools as we know them today.

Though heavily burdened by the duties of his professorship and its teaching obligations, in addition to a very large private practice, which brought him patients from all over the world, Doctor Kelly nevertheless found time for his varied interests in Natural History. Research and investigations were rapidly dividing science into its protean branches and it soon became impossible for any one man to remain a master in all of them. However aside from his own field of surgery Doctor Kelly could qualify as an "amateur expert" in many sciences. Herpetology remained his first love and throughout his life he continued to collect specimens, living and dead, and books, drawings and paintings in this field. For a period of years he kept in his employ the artist, E. F. Deckert, of Florida, and had specimens of snakes and reptiles forwarded to his studio from all over the world. A splendid collection, consisting of several hundred life-size watercolors, resulted from this association. On the porch of his residence in Baltimore and at his country place in Harford County Doctor Kelly maintained two or three dozen cages for snakes, lizards, and turtles, and kept them supplied through fellow herpetologists and by his own captures in Maryland and Florida. In more recent years he was in the habit of spending a month or six weeks of every winter in the Florida lake region, frequently occupied in searching for snakes. With a loop and forked stick he caught a good number of rattlers and at one time his right thumb was bitten by one of his intended victims. This resulted in preventing his return to surgical work for some months and in the cancellation of his accident policy by a canny insurance company. Among his contributions to herpetology is the beautifully illustrated "Snakes of Maryland", published by our own Society.

About 1915 the doctor's interest began to center on the almost limitless field of mycology. He began collecting assiduously in the vicinity of Baltimore and to a greater extent in the deep hemlock and maple woods surrounding his summer camp in Ontario, which offered a marvelously rich soil for the growth of a great variety of fungi. He sent for books and catalogues throughout Europe and soon built a large library on the fleshy fungi, many of the books being extremely rare and valuable. When his library on mycology was finally catalogued in 1938 it contained over ten thousand titles and was considered the finest in America excepting that of Harvard University which had the advantage of a couple of hundred years' head-start. The books and articles were supplemented by an invaluable series of paintings by Louis C. Krieger, a fortunate combination of artist and scientist, whose work is unchallenged as the finest in mycological illustration throughout the world.

The second floor of Doctor Kelly's library was set apart for this work and Mr. Krieger spent some ten years in his employ, completing the hundreds of sketches and paintings from fresh material. This rich collection of books, drawings, paintings and specimens, including a series of excellent wax models, was donated by Doctor Kelly to the University of Michigan where there is an active and keenly appreciative Department of Mycology.

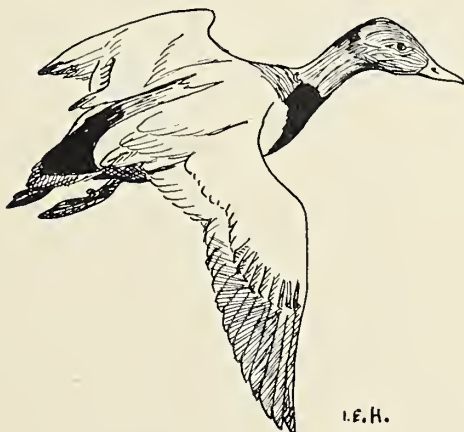
In the domain of botany, the doctor's early hobby, he retained his deep interest and made a vital contribution to this science in his volume "American Medical Botanists", biographical sketches of doctors of medicine who also left their imprint on botany- Doctor Forsyth (forsythia), Doctor Gardner (gardenia), and others. To a lesser extent but with no less enthusiasm Doctor Kelly studied and collected in the field of lichens and mosses and often entertained scholars in these sciences, as well as mycologists, at his summer camp. Shells, both marine and terrestrial, also held their fascination for him and he collected them assiduously on his Florida trips, donating to various museums or universities his findings, notable among them an ecological collection of ligui from the hammocks of the Everglades. He was appointed honorary Curator of Conchology in the University of Michigan.

Astronomy was one of his major interests. He spent many hours of the night studying the heavens, particularly in Ontario, was widely read and owned a substantial library in this field. At the summer camp on Ahmic Lake he set up a six-inch telescope with clockwork and never tired of explaining the glories of the heavenly bodies to family and friends. A devout Christian, Doctor Kelly never failed to see in astronomy and in all Nature the handiwork of our Heavenly Father. Meteors held a great attraction for him and he purchased several large and valuable specimens, the finest of which he subsequently donated to Vassar College.

How Doctor Kelly could find time for all these interests, in every one of which he would be considered an expert by ordinary standards, was an amazing mystery to all who knew him. It must be remembered that all this time, besides these avocations, he was engaged in an enormous practice of gynecology and in addition was the foremost developer and exponent of the use of radium in medicine, starting completely without predecessors in the field. He also published over thirty full-sized volumes on surgery of the bladder and genital tract and over five hundred articles on various subjects as well; he largely developed the use of the new weapon in surgery, the electro-cautery. He spent many hours in the study of the Bible, wrote numerous articles and collected a vast library of Bible commentaries, read extensively in both Greek and Hebrew; spoke hundreds of times in churches, was a lay reader in the Episcopal Church; engaged actively in campaigns for civic and political reform. His library, very complete in many departments, and requiring six volumes to catalogue it, contained tens of thousands of books, some very old and valuable. It included six four-hundred-year-old parchment missals, beautifully illuminated by hand, which Doctor Kelly presented to Oxford University. Moreover he also raised a family of nine children and gave unstintingly of his time and thought to their development, both material and spiritual. He was no recluse, no scholar withdrawn from the world of affairs; he had a veritable host of friends and constant visitors and his house on Eutaw Place was a "home away from home" for many missionaries from all over the globe.

Always enthusiastically engaged in one or another of his interests, Doctor Kelly was happiest at his camp in Ontario. He had first selected its site in 1891 while on a canoe-trip down the Magnetawan River and built his first log cabin (still in use today) in 1897. Thereafter, with the ever growing family of children and grandchildren, new cabins were added from year to year until the camp grew to resemble a small village. The summers were spent in swimming and canoeing, occasional fishing, and most happily of all in canoe trips up and down the river; he was skillful and fearless in shooting the numerous rapids en route. Always on the alert for the infinite phenomena of nature, expressed in plant, animal or rock, and the fungi particularly, he collected unceasingly and returned to study his specimens with books and microscope in his cabin.

"Indian Point" was the name given to the camp because the location had been used from time immemorial as a stopping place for the Ojibway Indians travelling between Hudson Bay and the Great Lakes. Many artifacts unearthed on the point gave supporting evidence of its former use. Of all the places on earth "Indian Point" was dearest to Doctor Kelly's heart. Next in his affections was his library on Eutaw Place where he wrote his books and received his countless friends. Few went away without a blessing and without having gleaned some new knowledge of the wonders of nature. He liked nothing better than to further the aspirations of eager young students and gave freely of his advice and of his treasure. A past president of the Maryland Academy of Sciences, he quickly switched his interest and energy to promulgating the newly formed Natural History Society, which offers more especially to boys and young men inclined toward the field of nature the same opportunities he himself sought so eagerly in youth. He remained a devoted member, patron and trustee of the society until the end of his days.



NOTES FROM FIELD AND LABORATORY

WHITE-WINGED SCOTER AT BALTIMORE IN JANUARY

Hampe and Kolb, in their "Preliminary List of the Birds of Maryland and the District of Columbia," report no January dates for the white-winged scoter, *Melanitta fusca deglandi*. I have one that just gets under the line: there was a female on Lake Ashburton, in Baltimore City, on January 31, 1941. On the evening of February 1 it was still present, but now revealed some disability, thrashing around without being able to rise from the water, and so I caught it and took it home. I could find no injury, and tried forcibly feeding it, but it died on the morning of February 3. I sent the scoter to the Fish and Wildlife Service for an autopsy, and in due time Dr. Harry C. Oberholser wrote:

"The duck that you sent has been examined by our expert on animal diseases and he finds that there is some trace of lead poisoning, which may have been the cause of the bird's death. He tells me that the action of lead poisoning is rather slow and the bird might have flown a much longer distance than from Chesapeake Bay."

Hervey Brackbill

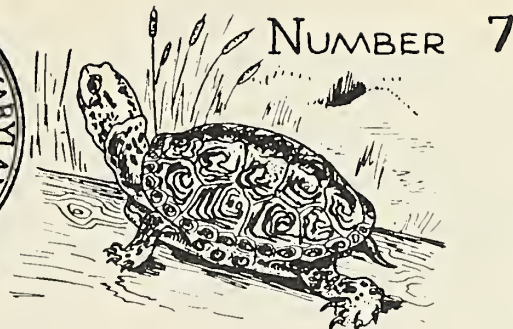
AMERICAN PIPITS IN WINTER

I find that when I assembled my records of the American pipit (*Anthus spinoletta rubescens*) in Maryland in winter (Maryland Nat., 18:14, 1948), I overlooked one. On January 11, 1942, two of these birds were foraging over the spottily snow-covered embankment of Lake Ashburton in Baltimore.

Like the other American pipits I have seen in winter, these appeared during a cold snap. From January 1 to 4 the temperature had averaged 6.5° above normal; the following seven days averaged 14° below normal, with minima of 8° on January 8 and 9° on January 11.

During half an hour that I watched these pipits, a flock of about 40 slate-colored juncos (*Junco hyemalis*) several times moved back and forth between the embankment and nearby fields. When this flock was on the embankment it sometimes engulfed one or both of the pipits, but these never followed when the juncos moved away again.

Hervey Brackbill



NUMBER 7

MARYLAND NATURE LEAFLET

WOODLAND WILDFLOWERS OF EARLY SPRING

by

EARL H. PALMER



SKUNK CABBAGE

When shall we look for the first flower of spring? The answer may surprise you: in January. Yes, deep in winter, even while the snow still lies on the ground, if you look along the marshy edges of woodland streams, you will find the first blossoms of the year, sometimes on New Year's Day itself. It is strange to go looking for wildflowers all bundled up in coats and gloves, but then it is a strange flower that we seek. You will find it springing from the black mud, poking itself up through the snow: a large, pointed hood, green with a heavy mottling of dark chocolate brown. Inside this hood is a fleshy ball attached at the base to a stalk, and on the ball are tiny knobs bearing yellow pollen. The pollen tells us that this odd thing is really a blooming flower, or rather it is a whole cluster of very simple flowers grouped on the fleshy ball and all protected by the richly colored hood. Though it may still be many weeks before the first pussy willows appear and the first frogs are heard, this plant, the Skunk Cabbage, tells

us that spring is surely on its way. Smell it and you will know the reason for the first part of its name; later, in March and April, come back to see the large, bright green leaves unfurling and you will see the reason for the second part of its name.

It is hard to say just what flower will be the next to bloom in our Maryland woodlands. But the place is more certain. It will be on some hillside facing the south where the spring sun shining through the leafless branches of the trees can warm the ground. On dry sand and gravel soils the next flower of the woodlands will probably be the Trailing Arbutus. On soils rich with black leaf-mold the Bloodroot or the Hepatica may be next. Soils and light are very important things in the life of plants and



BLOODROOT

Drawings by Edmund B. Fladung



TRAILING ARBUTUS

they have a great deal to do with the places in which different kinds of plants will grow.

With its white petals the Bloodroot stands out sharply against the background of dead brown leaves. The stems come directly from the ground, but near the base of each stem you can find the oddly shaped, bluish green leaf just peeping through. It is not until after the petals have fallen from the flower that the single leaf expands. Within a few weeks that leaf has produced enough food to last the plant until the next year. With the food safely stored in a thick underground rootstock, the part of the plant above the ground withers away soon after the maturing leaves of the forest trees have cut off the light of the sun from the forest floor. The Bloodroot gets its name from the bright orange-red color of its juice. The Indians used the juice as a dye.



HEPATICA

The Trailing Arbutus has a delightful fragrance which causes many people to search for it each spring. Unfortunately, it is a plant which grows very slowly and one thoughtless person can destroy the growth of many years in a few minutes. It is well to remember that the Maryland law forbids disturbing any plant without the written permission of the property owner. Even with such permission it would be much better to leave the Arbutus in its native woodland where a small patch can give pleasure to many people over a long period of years. It is not even a good idea to carry it home to your rock garden, for its chances of living there are very slim. It is a wild plant and, like many wild animals, can be cared for in captivity only by experts. The Trailing Arbutus is really a small creeping shrub with thin woody stems and dark evergreen leaves.



SPRING BEAUTY

The Hepatica will be found on wooded hillsides. The flowers lie close to the ground in the center of the dark, bronzy-green leaves of last year. Usually the flowers are lavender in color but some may be almost or quite white. When we come to search for the Hepatica in late March we often have to scrape away the dead leaves of the trees to find the plants. I think that the early settlers in Maryland must have been very happy to see the Hepatica after the severe winters of this unfamiliar America, for it is almost exactly like the Hepatica that they knew back in their European woodlands.

Look for the Spring Beauty in the little level places along the banks of the brooks which rush down steep ravines, or, a little later in the

season, on the floodplains along rivers. The pink flowers often form large mats of color in such places. Although the flower stems are rather long, the flowers never get very far above the ground, for the thin stems seem to be too tired to stand erect and sprawl against each other in a confused tangle. The Spring Beauty has a longer flowering period than most of the plants described in this leaflet. It is one of the earliest to begin blooming and often the flowers can still be found in the middle of May.

Where you find the Spring Beauty you can generally find the Dogtooth Violet also. This is really no relation to the violets but a member of the lily family. The nodding, bellshaped, yellow flowers are sometimes over an inch long and are certainly the most handsome of our early spring wildflowers. Even the leaves of this plant are handsome. They are broad and erect, a deep green, contrastingly mottled with maroon. This plant can be grown in gardens if a deep damp woodland soil is provided, but many people have been surprised when transplanting it to find that the bulb is sometimes buried as much as ten inches below the level of the ground. Sometimes the Dogtooth Violet is called Trout Lily, which is really a much more satisfactory name, for it shows its correct relationship and tells its time of blooming - in April, when the trout-fishing season opens.

The Wild Geranium is not very closely related to the house plant. The flowers are lavender or light purple and rather large. There may be a great many on a single plant. It grows along the edges of the woods, along paths and on railroad embankments, places that would be too dry or too sunny for such plants as the Spring Beauty or Jack-in-the-Pulpit. The Wild Geranium is often called the Cranesbill, because the seedpods which come later in the season have long slender beaks like the bill of a crane. The name Geranium comes from the old Greek name for a crane.

Many of our plants have several names by which they are known in different parts of the State. In the middle of April, on the deep rich soils along the banks of rivers we can find the large, light green plant which is sometimes called Virginia Cowslip, but just as often Bluebells, and at times Lungwort. It has beautiful flowers no matter what we may call it. There are many of them on each plant, large, trumpet-shaped blossoms on drooping stems. When they are first opening up they are pinkish, but when fully formed they take on a deep blue shade. In the woods along the lower Patuxent River near the Washington-Annapolis road there are



DOGTOOTH VIOLET



WILD GERANIUM



VIRGINIA COWSLIP

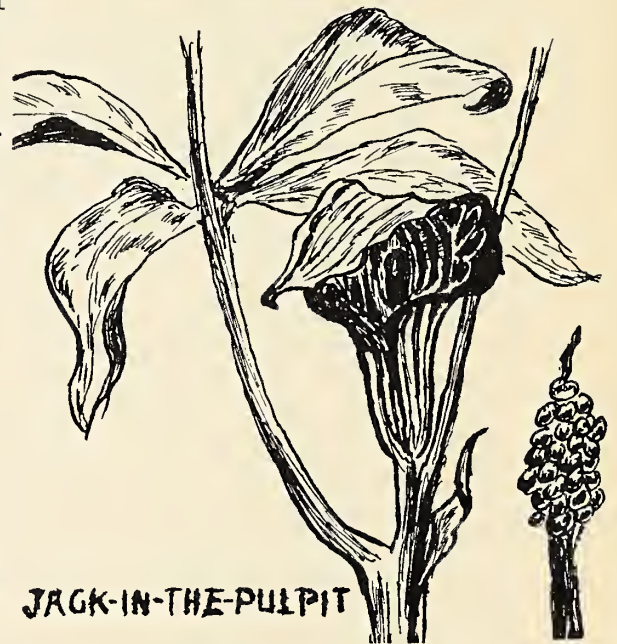


BIRD-FOOT VIOLET

acres of Virginia Cowslips, and I have no doubt other large colonies could be found in bottomlands elsewhere in Maryland.

It would not be spring without violets. Purple, lavender, white, and yellow, they are found in many places and in a great variety of kinds. Our illustration shows one that is to be found in dry soils, along the edges of the woods rather than in them. It is the Bird-foot Violet, so called because of the shape of the leaf. Of the five petals, the upper two are usually a much darker shade of purple than the three lower ones. In Maryland this variety is often called the Johnny-jump-up.

Everyone surely knows the Jack-in-the-Pulpit. Jack will generally be found in rich and deep woodland soil with the Dogtooth Violet and the Spring Beauty. His "pulpit" is a hood just like that of the Skunk Cabbage and the true flowers are tiny things hidden inside. The Jack-in-the-Pulpit does not, however, have much odor like its relative, but it does have a juice that makes red pepper taste as mild as milk. Country boys often trick their city cousins into tasting the fleshy root. Don't you get caught with a blistered tongue! In spite of this burning juice the Indians used the roots for food, but only after boiling out the juice in several changes of water. Jack-in-the-Pulpit is sometimes known as Indian Turnip.



JACK-IN-THE-PULPIT

As you have seen, many of our plants have several different names. You will be able to find more information about the plants described in this leaflet by looking up these names in the index of your reference book: Skunk Cabbage (*Symplocarpus foetidus*); Bloodroot (*Sanguinaria canadensis*); Trailing Arbutus (*Epigaea repens*); Hepatica (*Hepatica triloba*); Spring Beauty (*Claytonia virginica*); Dogtooth Violet (*Erythronium americanum*); Wild Geranium (*Geranium maculatum*); Virginia Cowslip (*Mertensia virginica*); Bird-foot violet (*Viola pedata*); Jack-in-the-Pulpit (*Arisaema triphyllum*).

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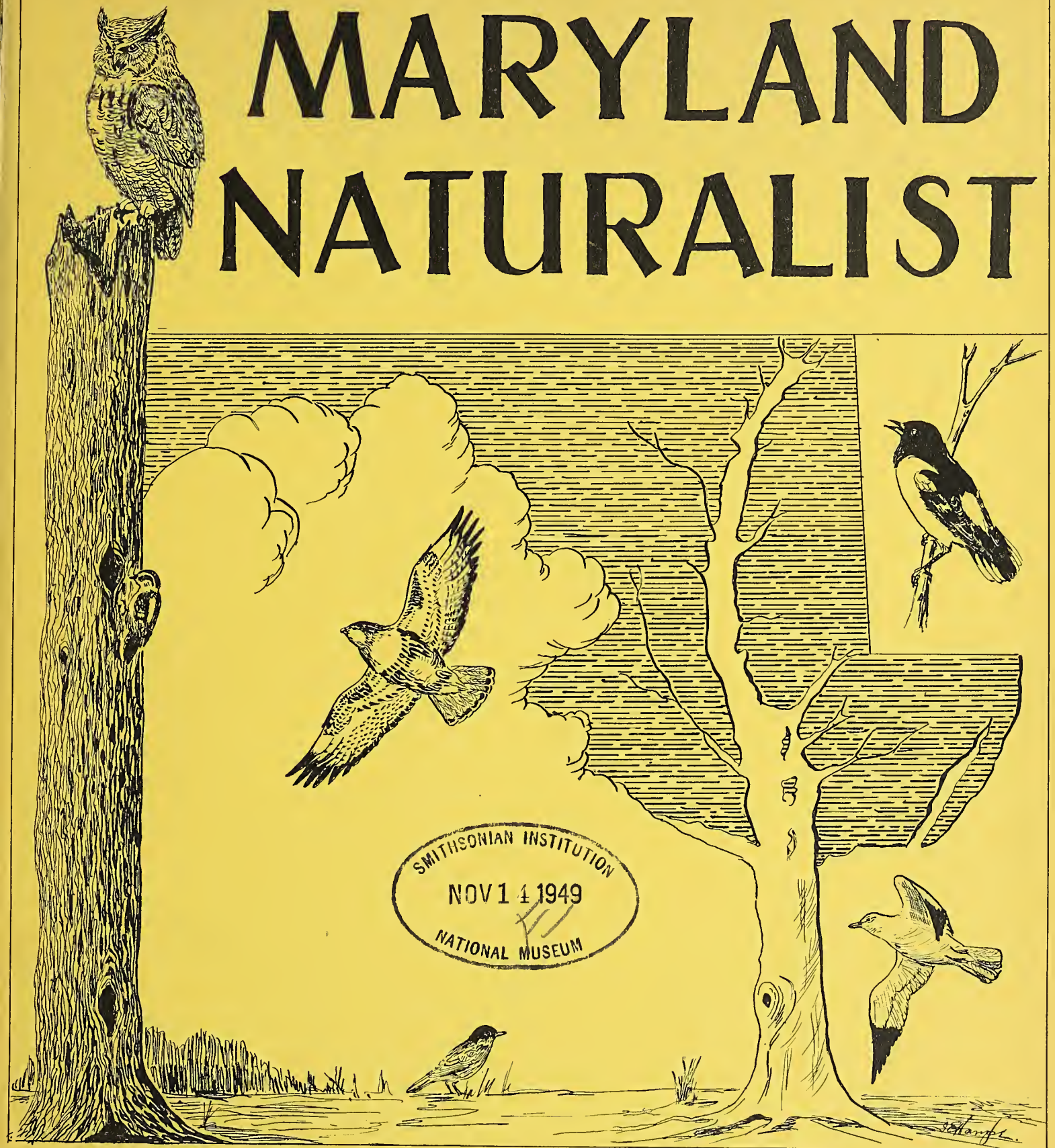
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SUMMER 1949

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MARYLAND NATURALIST



There is a pleasure in the pathless woods,
There is rapture on the lonely shore,
There is society where none intrudes,
By the deep sea, and music in its roar;
I love not Man the less, but Nature more,
From these our interviews.

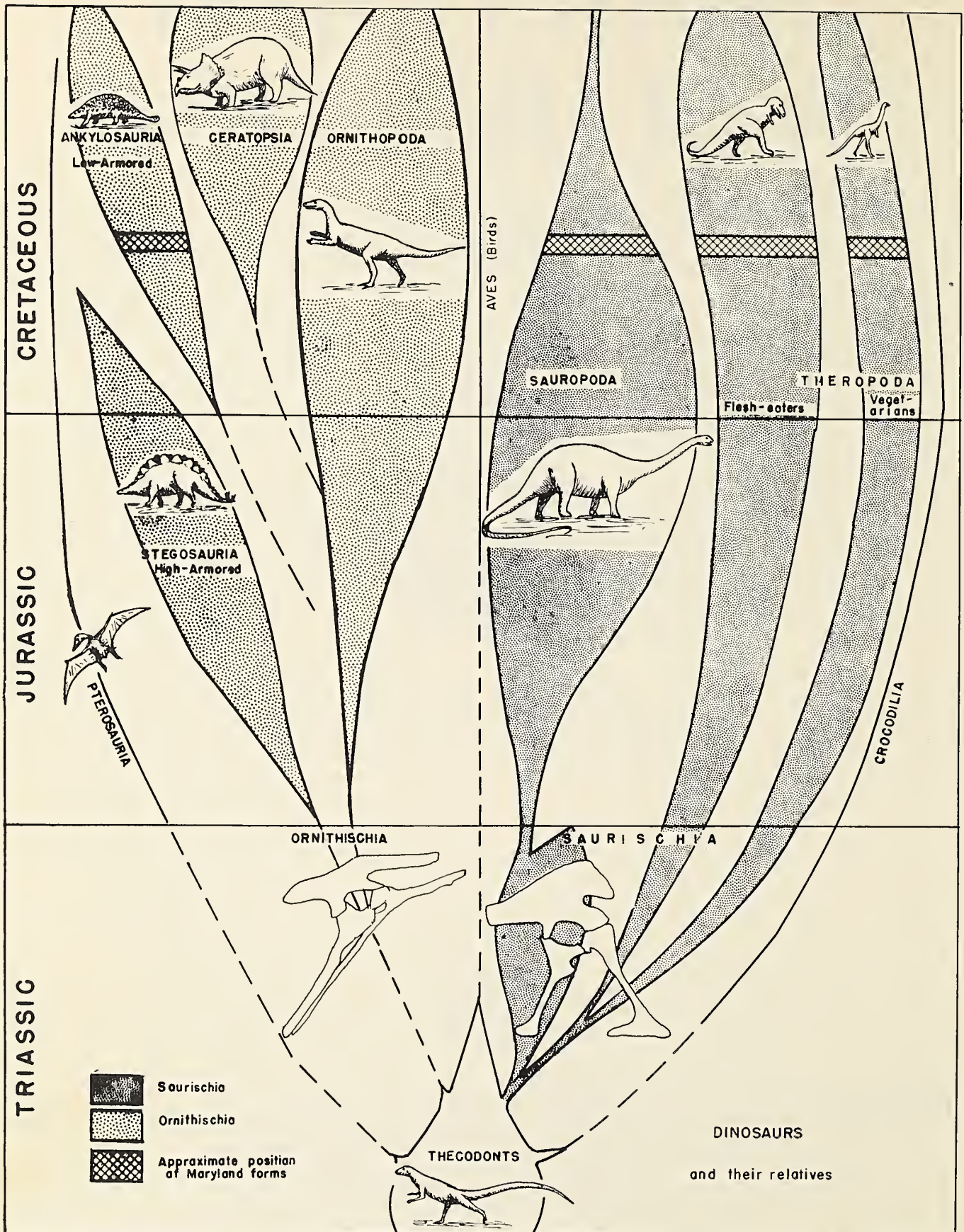
-Byron



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SUMMER 1949



MARYLAND DINOSAURS

by
H. E. Vokes *

The first Sauropod dinosaur to be described from North America was found in Maryland. Baltimoreans, who by tradition are often more concerned with the past glories of the State of Maryland than they are with its present realities, might glory in this fact if they knew about it--and could forget that the description was published by a Philadelphian!

Dinosaurs are the most popularly known of all paleontologic types, but withal, there is probably more misconception and pure misinformation extant concerning them than there is of any other group in the fossil record. In the first place, the very name, as coined by the famous early English paleontologist, Sir Richard Owen, holds a number of misconceptions. Owen called them "Dinosauria," a word derived from two Greek roots: *deinos*, terrible, and *sauros*, lizard. "Terrible lizards" he called them, yet modern studies and analogy with modern lizards suggest that only a very few of them could, by any stretch of the imagination, have been really terrible animals. Lizards, he called them, yet modern studies suggest that they are more closely related to the birds (and the crocodiles) than they are to the true lizards. And he made of them a single order of the reptilia, the dinosauria, yet modern studies show that they include not one, but two orders, no more closely related to each other than either are to the birds and crocodiles. In other words, it is not only Mr. John Doe who has had misconceptions concerning these animals; it has taken the vertebrate paleontologists a great many years and much study to eliminate many of their misconceptions and to arrive at the present state of knowledge and understanding of these reptiles. There is yet much to be learned, but what is now known is well worth investigation.

We find the beginning of the dinosaur story in the early stages of the Triassic period, the initial period of the Mesozoic era. And from present fossil evidence, it was initiated in the Old World. Here in the Lower Triassic of Europe, Asia and South Africa we find small reptilian types that were blessed with great future potentialities. The more generalized forms were only about three to four feet long, and a great portion of this length was tail. In appearance they might well have had a fairly close resemblance to a large modern lizard; but this resemblance was superficial only, for its internal skeletal structure was quite different. Accustomed to run on its hind legs, it had short fore limbs and a hip structure that was modified to permit the animal to support its weight on the unusually long hind limbs. More striking, was the lightening of the skull by the development of paired openings through its wall. Two pairs were located laterally, behind the eyes, with a third pair on the snout in front of the orbits.

The presence of two pairs of skull openings behind the eye is a characteristic that is held in common by the two orders of the dinosaurs, as well as by the ancient birds, the crocodiles, and the extinct flying reptiles, the

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Pterodactyls, all descended from the same ancestral group.

From this bipedal, light-headed, ancestry developed the two groups of ground-dwelling reptiles that we know as the dinosaurs. These were distinct from each other from the start. The most easily recognizable characters separating them are to be found in the structure of the bones of the pelvic region, and the names of the two orders into which the dinosaurs are divided are based on these pelvic differences.

The hip bones of any land animal consist of three parts: a plate-like bone, called the ilium, situated above the socket for the thigh bone, which fuses to the vertebral column to make a solid structure for the support of the weight upon the limb bones; an ischium situated behind and below the socket, and a pubis similarly located in front of it. (In the mammals these three hip bones have been fused into the one pelvic element with which we are all acquainted.)

In the more primitive land animals the ischium and pubis are plate-like, and joined beneath the socket. In the dinosaurs there is considerable modification of these lower hip elements. In both orders these two bones have lost their plate-like characteristics, being essentially strong, rounded bones. In one order the ischium slants at an oblique angle posteriorly, with the pubis similarly slanting at an angle, anteriorly. The result is a tri-radiate pelvis with each of the three hip bones running from the hip socket at a considerable angle from the others. This structure is superficially quite similar to that of ordinary reptiles, and the order is accordingly known as the "Saurischia" or, loosely translated, the "reptile-hipped" dinosaurs. In the other order there has been a striking modification of the pubic structure. Instead of projecting forward, the pubis has rotated back until it lies right below the ischium, and projects obliquely toward the rear. But this left no anterior structure for attachment of belly muscles as well as thigh musculature. So a new bony process grows forward from the base of the pubis to take on this function. The appearance of this new anterior process of the pubis results in an essentially tetra-radiate type of pelvis that parallels that of the birds; the order of dinosaurs that is marked by the possession of this type of structure is accordingly known as the "Ornithischia," or bird-hipped, dinosaurs.

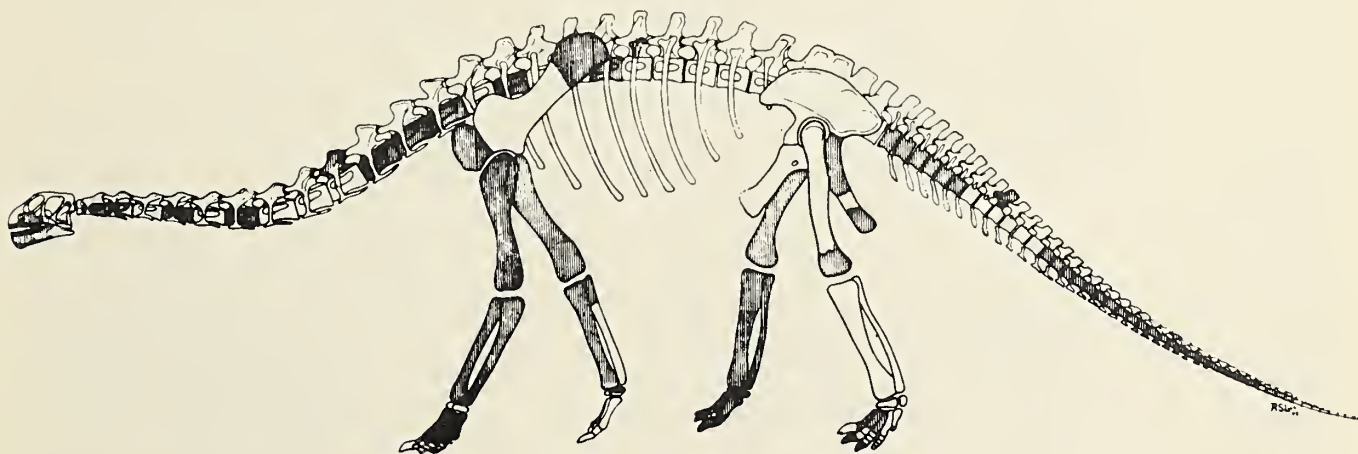
Among the Saurichians are to be found those types of dinosaurs that are perhaps most widely known by the non-scientific laymen. Here are the giant meat-eaters, typified by the great upper Cretaceous form *Tyrannosaurus rex*, "king of the tyrant reptiles," standing about 18 feet high at the shoulder, with an over-all length of at least 50 feet, and a weight that must have approached ten tons. Its Jurassic analogue, *Allosaurus*, was only slightly less fearsome, with a length in excess of 35 feet. Both of these animals ran on their hind legs and were equipped with long, dagger-like teeth made more terrible as weapons by the development of serrated, or saw-toothed margins. In *Tyrannosaurus* some of these teeth are as much as eight inches in length.

Relatives of these flesh eaters were present in Maryland during the Cretaceous period. The material marking their presence is very scant, consisting of the crown of one of the characteristically serrated teeth, and a

single vertebra from the tail region. The tooth was originally referred to the genus *Allosaurus* by the great paleontologist Marsh, who established the Yale University fossil collections; it has more recently been questionably referred to the genus *Dryptosaurus* by the late Dr. Charles W. Gilmore of the U. S. National Museum.

Close relatives of the giant flesh eaters were smaller, graceful bipedal types that probably fed upon insects and other types of small prey. These were fast running types with a skeleton modified to lighten the weight of the animal in order to permit it to develop greater speed of movement. The principal modification consisted in the development of hollow bones. One of the extreme types of this group is represented in our Maryland fauna by a single toe bone from a fore foot that is questionably referred to the genus *Coelurus*, a genus that is represented in the Jurassic deposits of the west by forms that were probably twice as large as the Maryland species. In these western forms the bones are so reduced that the walls of the vertebrae, for instance, are of paper-like thinness. It was an exceedingly slender, graceful type.

Another representative of this line, represented in the Maryland collections by a number of elements of the hind foot, is a larger type closely related to an Upper Cretaceous form found in the Edmonton beds of the Canadian prairie region. This form, called *Ornithomimus*, or "bird mimic" was a highly specialized type which, in addition to the development of hollow bones, has added a toothless jaw that was, presumably, sheathed with a horny substance similar to that of the beak of the birds. The toes of the fore-limbs were long and had developed a "grasping" power. It has been suggested that they were specialized for the robbing of the eggs of other dinosaurs; these could be grasped in the "hands" and crushed by the beak. These bipedal types have long, clawed toes, and are therefore referred to as the Thereopods, or "beast-footed" Saurischians.



Astrodon nanus (Marsh). The smallest known Sauropod Dinosaur with a length of twelve or thirteen feet. Composite restoration by Lull based upon fragmentary remains of several individuals. Known portions shaded.

With these striking Theropod types we have to associate on the basis of the structure of the pelvic region, the elephantine, presumably amphibious, four-footed dinosaurs that are typified, to most people, by the great *Brontosaurus* or "thunder lizard." Here we find the true giants of the dinosaur realm: *Brontosaurus*, some 70 feet in length from the tip of the snout of his almost absurdly small head to the end of his long tail; *Diplodocus*, 87 feet long, due to his even longer tail; *Brachiosaurus*, the true giant of the lot, although only 80 feet long, because he had a relatively small tail, a stout, massive body, with unusually long fore legs. In front of his shoulders was a long neck, which with the long fore legs would have permitted him to look over a three-story building.

But all of the members of this group were not giants, and in Maryland we have the smallest of the lot. *Astrodon nanus* was only 12 or 13 feet long, and about 4 feet high at the shoulder of his rather long fore limbs. This is by far the best known species of dinosaur found in Maryland since nearly all of the more important parts are known, though not all from the same individual. The illustration, taken from Lull's redescription of the form, shows the known parts of the skeleton.

Two other species referred to the genus *Astrodon* are known from this State. *A. altus* is represented by some limb and toe bones, a caudal vertebra and a rib; all are almost three times as large as the corresponding elements in *A. nanus*. *A. johnstoni* consists of two teeth; they may have come from the form known from skeletal elements as *A. nanus*, but this cannot be proved.

But *Astrodon johnstoni* bears a historical significance beyond all proportion to the amount of the animal preserved to us. These two teeth were the first dinosaur remains to be collected in Maryland, having been recovered from a bed of iron ore near Bladensburg, Maryland, by a Mr. Tyson who presented them to Dr. Christopher Johnston, a local naturalist. Dr. Johnston gave them the generic name *Astrodon* in an article published in 1859 in the American Journal of Dental Science (vol. 9, 1859, p. 341). Unfortunately, he did not describe them and it remained for the great naturalist from Philadelphia, Dr. Joseph Leidy, to formally describe and name them. This he did in 1865, adopting and validating Johnston's generic name *Astrodon* and giving them the specific name *johnstoni* in honor of the doctor who had first called attention to their existence. This was the first sauropod dinosaur described from North America, mentioned in the introductory sentence to this article. For these great swamp-dwelling, quadrupedal dinosaurs are known as Sauropods, or "reptile footed" saurischians. The name does not seem too appropriate since the great weight of the animals resulted in a massive, pillar-like leg, with relatively short toes, that must have resembled that of the elephant much more closely than it did the slender foot of most modern lizards.

The great "flowering" of the Ornithischian dinosaurs occurred in late Cretaceous times, although they are represented in the Jurassic deposits. Since the Maryland dinosaur-bearing strata are of lower Cretaceous age, it follows, however, that our representation of the Ornithischian types is much less complete than is that of the Saurischians, where we have, as noted above, fragments indicating the presence of seven different species. In contrast,

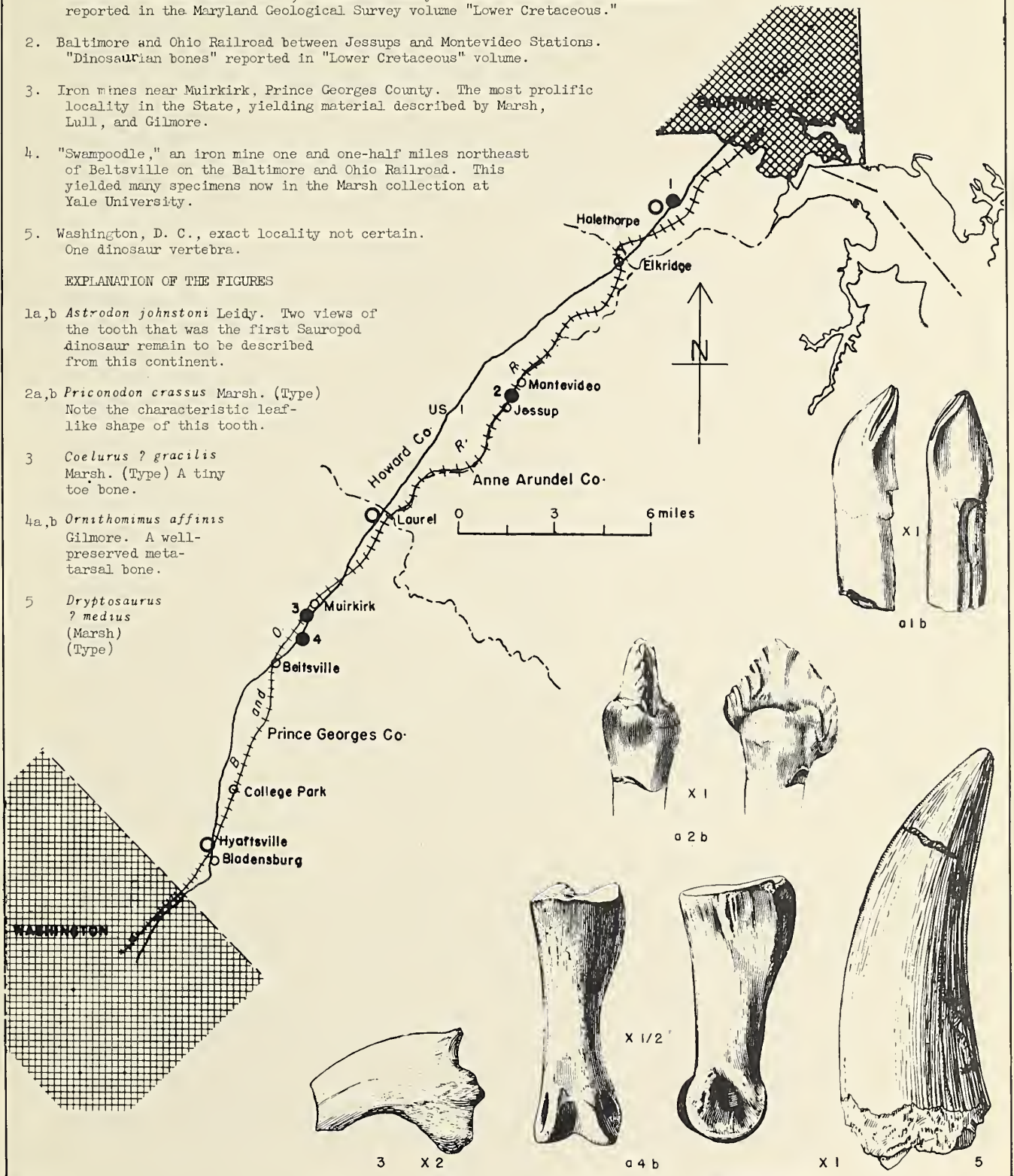
SOME MARYLAND DINOSAUR REMAINS AND THE LOCALITIES WHERE THEY WERE FOUND

Dinosaur remains have been reported from the localities numbered on the map as follows:

1. Iron mine at Schoolhouse Hill, Baltimore County. "Teeth and bones of dinosaurs" reported in the Maryland Geological Survey volume "Lower Cretaceous."
2. Baltimore and Ohio Railroad between Jessups and Montevideo Stations. "Dinosaurian bones" reported in "Lower Cretaceous" volume.
3. Iron mines near Muirkirk, Prince Georges County. The most prolific locality in the State, yielding material described by Marsh, Lull, and Gilmore.
4. "Swampoodle," an iron mine one and one-half miles northeast of Beltsville on the Baltimore and Ohio Railroad. This yielded many specimens now in the Marsh collection at Yale University.
5. Washington, D. C., exact locality not certain. One dinosaur vertebra.

EXPLANATION OF THE FIGURES

- 1a,b *Astrodon johnstoni* Leidy. Two views of the tooth that was the first Sauropod dinosaur remain to be described from this continent.
- 2a,b *Priconodon crassus* Marsh. (Type) Note the characteristic leaf-like shape of this tooth.
- 3 *Coelurus ? gracilis* Marsh. (Type) A tiny toe bone.
- 4a,b *Ornithomimus affinis* Gilmore. A well-preserved metatarsal bone.
- 5 *Dryptosaurus ? medius* (Marsh) (Type)



the Ornithischian remains consist of but six teeth, all referable to the same species. Surprisingly enough, these teeth seem to belong to a genus of the low-armored dinosaur types, the least well known of all of the dinosaur sub-orders found on the North American continent. These were plant-eating animals that had developed a great external armor of bony plates for protection from marauding cousins of the Theropod clan. They have been compared to the modern tanks, but their armor seems to have been rather of the nature of a Maginot line type of defense, rather than of an offense as typified by a tank.

Described as *Priconodon crassus*, these teeth have a peculiarly leaf-shaped crown with serrated edges and a swollen base above a narrowed root area. They clearly resemble, but are somewhat larger than, those of the low-armored genus *Paleoscincus* known from relatively complete skeletal material found in Montana.

To complete our picture of the known dinosaur groups, mention must be made of the other Ornithischian types that are not represented in the Maryland fauna. Most abundant, varied and unusual of the sub-orders of Ornithischia are the so-called "duck-billed" dinosaurs. These are all characterized by the presence of a horny beak in the front of the jaw, with an imposing array of teeth in the rear that are strikingly modified into a great plate for the grinding of the plant material on which they fed. The essentially cone-shaped reptile tooth did not lend itself readily to modification into a flat, pavement-like surface for the grinding of herbaceous material, such as is developed by many mammalian types, especially the elephants, and the horses, cows and their relatives. Since one tooth couldn't be altered in this way, these dinosaurs solved the problem by pressing a multitude of teeth into service at one time. By having these grow out in closest proximity to each other, a reasonable facsimile of a grinding surface was developed. Now dinosaurs, and all other reptiles, are not limited, as are mammals, to two sets of teeth, so these teeth in the dinosaur apparatus were replaced as they were worn down through use. The result was that some of the upper Cretaceous types of duck-bills had as many as 2,000 teeth in their mouth at one time, including those in use, and those growing up to take their place. These unusually well-equipped animals were bipedal types, mostly swamp dwellers, some of which, at least, had webbed toes, while others had bizarre modifications of the nasal passages to permit them to hold their head below the surface of the water for relatively long periods, apparently while feeding on lily roots and other succulent vegetation.

Associated with them, in the upper Cretaceous, was a completely different type that superficially bore a striking resemblance to the modern rhinoceros. These were quadrupedal animals with a massive body, moderately long tail, and heavy head that bore along its hinder margin a great frill of bone to protect the neck area against attacks from their Theropod associates. For defense, they bore, in addition, long bony horns on the skull. Usually there were three of these horns, one over the nose and one over each eye on the "forehead". In some types the nasal horn was long with those on the forehead relatively short and insignificant; in others, the reverse was the case. In its great development this group was an exclusively North American dinosaur form. In its early stages, however, it was an Asiatic type, and its lower Cretaceous ancestors were found by the Roy Chapman Andrews expeditions in the Gobi desert area.

These were smaller animals, lacking all trace of the horns on the "forehead" and with only a suggestion of the nasal horn. They gain their fame from a different source, for they are the types that laid the famous dinosaur eggs. From these and from the abundant skeletal material found in the region, we know all of the growth stages of the animal, and have a much more complete picture of the development and characteristics of this dinosaur than of any other type.

Finally to be mentioned are the "high-armored" dinosaurs, typified by the Jurassic *Stegosaurus*. This is the well-known type that had thick bony plates standing up along the back from the head to the tail, and on the latter, a giant "mace" in the form of long, pointed bony spikes. Apparently, when attacked he would turn tail, but, like the skunk, only because his strongest defense lay in that region.

To summarize our story, we need only point out that the swamps of the Lower Cretaceous time in the region that is now the State of Maryland served as a burial place for eight species of dinosaurs, all but one of which are to be referred to the order Saurischia, or "reptile-hipped" dinosaurs. These are allocated as follows:

Order Saurischia:

Sub-order Theropoda

Infra-order Carnosauria

<i>Dryptosaurus ? medius</i> (Marsh)	(one tooth)
<i>Dryptosaurus ? potens</i> (Lull)	(one caudal vertebra)

Infra-order Coelosauria

<i>Coelurus ? gracilis</i> (Marsh)	(one ungual phalanx)
<i>Ornithomimus affinis</i> (Gilmore)	(a number of elements of the hind feet)

Sub-order Sauropoda

<i>Astrodon nanus</i> (Marsh)	(many skeletal elements)
<i>Astrodon altus</i> (Marsh)	(limb bones, vertebra, and rib)
<i>Astrodon johnstoni</i> (Leidy)	(2 teeth)

Order Ornithischia

Sub-order Ankylosauria

<i>Priconodon crassus</i> (Marsh)	(6 teeth)
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All of these remains were found in connection with the mining of sedimentary iron ores present as nodules and crusts formed during the period of the deposition of the Arundel formation, the middle formation of the lower Cretaceous Potomac Group. All of the bones and teeth were recovered during the latter half of the last century, during the period when these ores were being worked. So far as I am aware, no specimens have been found since mining ceased. The accompanying map shows the localities where dinosaur bones have been reported. The re-investigation of these areas might well pay dividends, for the natural weathering that has taken place during the past fifty years may have uncovered additional material representing these and other dinosaur types which furnish so unique an element in the fauna of Maryland's prehistoric past.

NATIVE FLOWERS FOR SHADY GARDENS Facing North, Northeast and Northwest, in Maryland Area.

by

Andrew Simon

To many people the growing of native plants and ferns under gardening conditions constitutes a hobby of no mean choice. A bit of Woodland in one's own backyard satisfied the back-to-nature craving in many a heart. A shady corner under a tree or even in the shade cast by the neighbor's house will be enough to start the "thrill of a life-time." In earliest Spring it will be full of bloom--the dainty flowers of Bloodroot, Hepatica, Trillium and Yellow Lady Slipper. In midsummer there will be less color, but what is more satisfying than ever-changing flecks of sun and shadow, green tracery of ferns, and contrasting texture of foliage!

"Fringed pool, ferned grot--the veriest school of Peace"

If there is room for heavier plant material, use nursery-grown Rhododendrons (various); Ilex (various Hollies); Azaleas (various, both evergreen and deciduous); Pieris (Andromeda); Leucothoe; *Kalmia latifolia* (Mountain Laurel) all of which are evergreen. For deciduous shrubs, *Cornus florida* (White Dogwood); *Benzoin aestivale* (Spicebush); Hamamelis (various Witch Hazels); *Clethra alnifolia* (Pepper-bush) can be used to excellent advantage.

For culture, remove old soil to a depth of six inches. Fill in with one-third leaf mold, one-third topsoil and one-third sand. Use any coarse bank sand except limestone. Lime, of course, destroys the acidity needed by native woods plants. Do not use manure or commercial fertilizer. If leaf mold is not available, peat moss may be used. If peat moss is used, however, aluminum sulphate should be added for acidity according to the needs of the plants.

This is a partial list of species for shady gardens, many of which plants are available from local nurseries:

Orchis spectabilis	Showy Orchis
Cypripedium pubescens	Yellow Lady's Slipper
Habenaria ciliaris	Yellow Fringed Orchis
Viola pubescens	Downy Yellow Violet
Viola canadensis	Canada Violet

Trillium cernuum
 Trillium undulatum
 Trillium erectum
 Trillium grandiflorum
 Mertensia virginica
 Dentaria diphylla
 Anemonella thalictroides
 Asarum canadense
 Cimicifuga racemosa
 Polemonium reptans
 Oxalis acetosella
 Dicentra eximia
 Dicentra cucullaria
 Sanguinaria canadensis
 Aquilegia canadensis
 Claytonia virginica
 Geranium maculatum
 Geranium pratense
 Mitella diphylla
 Tiarella cordifolia
 Hepatica triloba
 Iris cristata
 Arisaema triphyllum
 Clintonia borealis
 Polygonatum biflorum
 Phlox divaricata
 Lilium superbum
 Tradescantia virginiana
 Dodecatheon meadia
 Thalictrum dioicum
 Gentiana linearis
 Monarda didyma
 Uvularia sessifolia
 Lysamachia quadrifolia
 Chelone glabra
 Hypoxis hirsuta
 Heuchera americana
 Saxifraga virginensis
 Sedum ternatum
 Ranunculus fascicularis
 Anemone quinquefolia
 Medeola virginiana
 Maianthemum canadense
 Melantherium virginicum
 Aralia nudicaulis
 Lobelia cardinalis
 Lobelia syphilitica
 Eupatorium purpureum
 Eupatorium urticaefolium
 Aster divaricatus

Nodding Trillium
 Painted Trillium
 Common Wake-Robin
 Snow Trillium
 Virginia Blue-Bells
 Crinkleroot
 Rue Anemone
 Wild Ginger
 Snakeroot - Black Cohosh
 Greek Valerian
 Common Wood Sorrel
 Cutleaf Bleeding-heart
 Dutchman's Breeches
 Bloodroot
 Wild Columbine
 Spring Beauty
 Wild Geranium, pink
 Blue Wild Geranium
 Mitrewort
 Foamflower - False Mitrewort
 Roundlobe Hepatica
 Crested Iris
 Jack-in-the-Pulpit
 Bluebeads
 Small Solomon's Seal
 Blue Phlox
 Turk's-cap Lily
 Spiderwort
 Shooting Star
 Early Meadow Rue
 Narrow-Leaved Gentian
 Beebalm
 Bellwort
 Four-leaved Loosestrife
 White Turtlehead
 Yellow Star-grass
 Alum Root
 Early Saxifraga
 Wild Stonecrop
 Early Buttercup
 Wood Anemone
 Indian Cucumber-Root
 False Lily-of-the-Valley
 Bunch-Flower
 Wild Sarsaparilla
 Cardinal Flower
 Great Blue Lobelia
 Joe-Pye Weed
 White Thoroughwort
 White Wood Aster

Senecio aureus
Epipactis pubescens
Aruncus sylvester

Golden Ragwort
Downy Rattlesnake Plantain
Goat's Beard

A special note of caution is in order. There are a few varieties of native plants that are almost impossible to transplant. Three of the most common, and perhaps the most tempting are *Cypripedium acaule*--Pink Moccasin Flower; *Epigaea repens* -Trailing Arbutus; *Gentiana crinita*--Fringed Gentian (an annual). All persons interested in conserving our native material are strongly urged not to attempt to transplant or disturb them anywhere or at any time.

For those fortunate enough to own ten square feet or ten square miles of shade or woodland, the plants named above will be almost sure to feel at home in locations facing North, Northeast and Northwest.

Geologic Sketches - Pot-holes

by

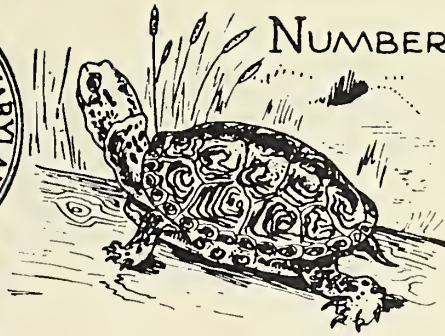
Joseph F. Schreiber, Jr.

River erosion is accomplished in a variety of ways resulting in the sculpturing of the face of the Earth. Corrosion is the chemical or solvent action of water and is especially effective on those rocks which are relatively soluble, such as limestone and dolomite. Rock materials are loosened mechanically and swept along by the hydraulic action of water alone. A rapidly moving stream, heavily charged with boulders, pebbles, and sand, wears down the sides and bottom by corrosion.

One of the most powerful methods of down-cutting is the drilling of pot-holes. These pot-shaped depressions develop in rocky channels and hollows with boulders and pebbles acting as the main drilling tools. Swirling waters keep the tools moving rapidly, cutting deeper into the rock. They are broken up and worn down by attrition and the finer particles are swept out as new ones enter the hole. Often, well rounded boulders can be seen in the holes today. Large "plunge pools" may develop in front of waterfalls deepening the channel and under-cutting the edge of the falls.

Many good examples of pot-holes can be observed in Maryland; a majority of these are found among the rocks in the streams crossing the "fall line". There are a number along the Jones Falls near the junction of the Falls and Clipper-mill Roads and in the Big Gunpowder Falls near Harford Road. They are most abundant among the rocks in the larger rivers such as below the Conowingo Dam in the Susquehanna River, and at the Great Falls and the Little Falls of the Potomac River. In some of these holes a man could stand.

Reference: Holmes, A. Principles of physical geology. The Ronald Press Company, New York, 1945.



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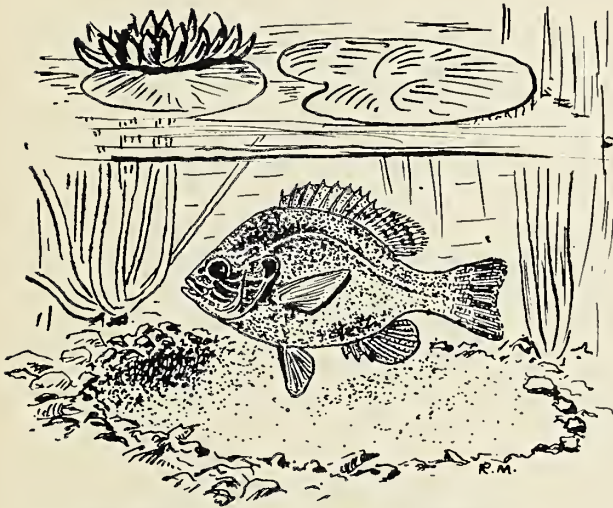
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MARYLAND NATURE LEAFLET

COMMON FRESH-WATER FISH OF MARYLAND

by

Donald Russel Crawford, Jr.



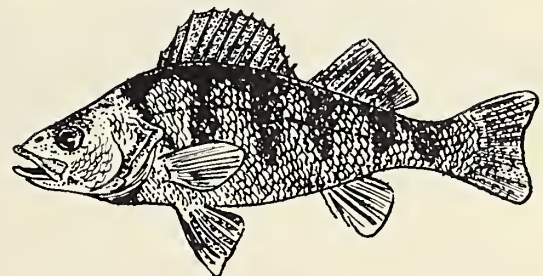
PUMPKINSEED ON NEST

fight to make the catching interesting. We can easily identify the yellow perch after we have hooked one, by the vertical bars of black which alternate with vertical bars of olive and yellow.

Tiny plants and animals which we can see only under the microscope are the chief food of the young perch. As the fish grow larger they need larger food. Water insects, snails, and even smaller fish are then eaten. On the other hand the perch itself serves as food for some of the larger fish. Indeed, all the living things in the pond or slow stream where the perch live are a part of a very

To many Marylanders fishing means the Chesapeake Bay with a catch of big stripers or hardheads from a boat on wide waters. To others, going fishing means a rushing woodland brook or a lazy meadow branch where the fishes of fresh water may be caught. Many of these fish are rather small by salt-water standards, though some may reach large size in the bigger rivers. Some can be captured only after a hard fight, while others can be landed with almost no resistance by the smallest child.

Everyone who has wet a line in Maryland waters must be familiar with the yellow perch. Not only is it a common fish, but it is also an excellent one for the frying pan. It can be caught with almost any kind of tackle and on a light line will put up enough

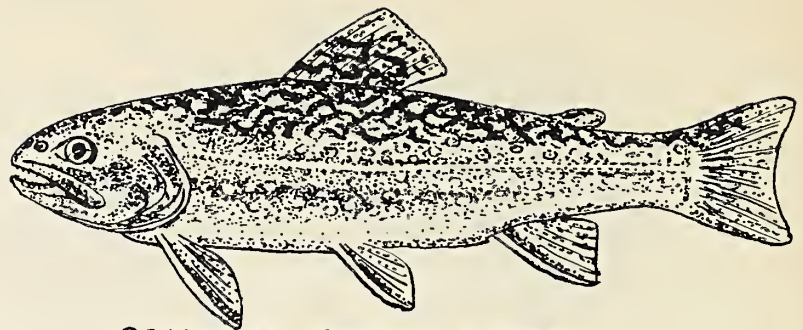


YELLOW PERCH

Drawings By Romeo Mansueti



BROWN TROUT

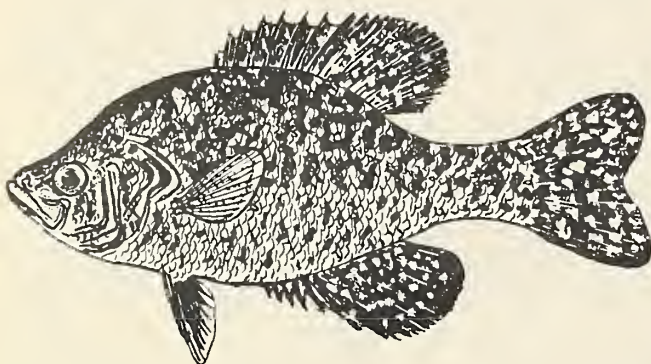


COMMON BROOK TROUT

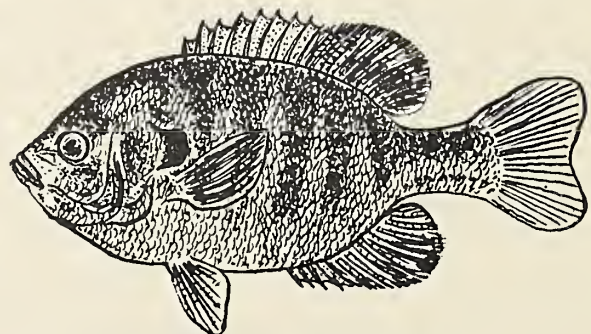
complicated chain of food relationships. Any person who wants to raise fish must understand these food-chains, for without a proper supply of foods at each stage of their growth, fish cannot get to a size where they can be used as a food for man.

To some fishermen the perch is hardly worth noticing. Only the dashing trout will satisfy those who love a rapid, clear and cold mountain brook. Three kinds are found in the waters of Maryland. Our native brook trout, also known as the speckled, square tail or red-spotted trout is a fish of cold and clear waters of Western Maryland. Eastward its place is taken by the introduced brown trout from Europe. The brown trout is also a fine game fish, but it will live in warmer waters than the brook trout, and it does not require that the water be rapidly moving. It is distinguished by many black spots and some red spots - the latter larger and less brilliant than those of the brook trout. The third kind of trout has been introduced into Maryland waters from the western parts of the United States. This is the rainbow, which is also black spotted but gets its name from the long horizontal rainbow stripes, one on each side of its body. All the trout like gravelly or sandy bottoms of clear cold mountain-streams for their egg-laying. Trout are so popular with fly-fishermen that enough can be maintained for the many people who buy fishing licenses in our state, only by raising thousands of them in hatcheries and placing them in the streams just before the fishing season opens.

The pumpkin seed or common sunfish is the small boy's fish, to be taken with a simple willow pole and a plain earthworm as bait. Although it only reaches a length of about eight inches, it is a satisfactory re-



BLACK CRAPPIE



COMMON BLUEGILL



COAST RAINBOW TROUT



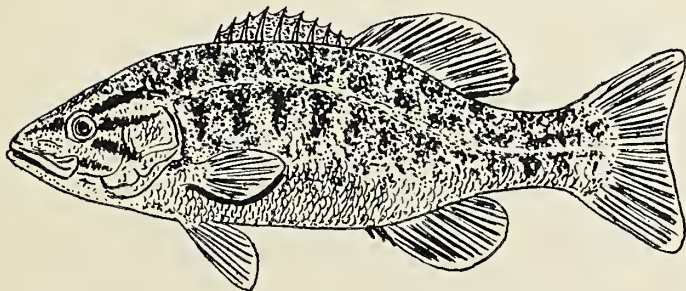
CHAIN PICKEREL

ward for the patience of the young fisherman. The pumpkinseed likes rather still, clear waters and schools of them can often be seen in the shallow places basking in the sunshine. Everyone knows that birds build nests and care for their young ones, but it is probably a surprise to many people to find that some fish also do this. The pumpkinseed is one of these. A saucer-shaped hollow is swept out of the sand or gravel and the eggs are laid in it. Then the male fish stands guard over the eggs and sometimes over the young fish, called fry.

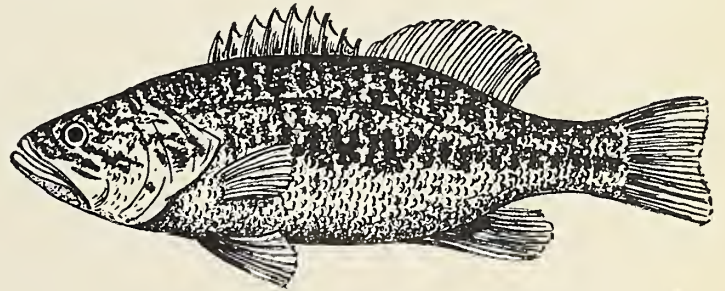
Another of the sunfishes and a close relative of the pumpkinseed is the bluegill. Although it does not seize the hook with a rush as do the true game fishes, the bluegill will put up a good fight for its size. It is also a fine food fish. In many places today people have taken to building small ponds in which a supply of good fish can be raised for food just as the farmer raises chickens or pigs on land. In such ponds the bluegill is a favorite fish.

The crappie is often as common in still waters as the pumpkinseed and bluegill, but it is not native to most of the state. The crappie has no sporting qualities, but it is a good fish. It has therefore been raised a great deal in farm ponds.

The young bluegills, pumpkinseeds, and crappies serve as food for the basses. In Maryland few fishes can rival the two kinds of black bass as game fish. The main difference between the two kinds is in the size of the mouth. In the largemouth bass the jaws extend back beyond the eye, while in the smallmouth bass they extend only as far as the middle of the eye. The largemouth is more a fish of ponds and lakes while the smallmouth is found principally in streams. Not only do they eat the small sunfishes mentioned above, but they also eat each other, and are thus true cannibals. Although they look quite different the basses are close relatives of the sunfishes and have some of the



NORTHERN SMALLMOUTH BASS



LARGEMOUTH BASS



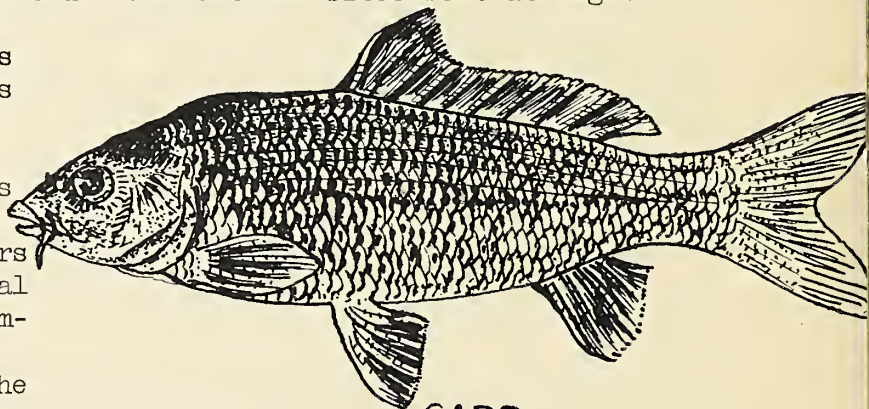
NORTHERN BROWN BULLHEAD

caught and sold in the markets by commercial fishermen.

In Maryland the chain pickerel is a game fish of considerable importance, though it cannot compare at all to its close relative of northern lakes, the muskalonge. Like the black basses the pickerel lives off other smaller fish. It likes to lurk in the weeds along the edges of lakes and dart out suddenly to catch its prey. The pickerel can easily be recognized by the net-like markings on the sides, by the long jaws, and by the fin on the back just a little in front of the tail. We can readily understand that the pond-owner interested in producing food fish is not eager to have either bass or pickerel in his ponds. On the other hand, the sport fisherman loves the struggle to land the game fish. Both food or "pan" fish and game fish can have a place in our Maryland waters if we are wise enough to manage them properly.

The brown bullhead, a kind of catfish, lives in still or slow-moving waters and does not mind if those waters are muddy. It is a very hardy fish. If there is not enough oxygen in the water it can come to the surface and gulp in air. It is also a good fish for food. The catfish bites best at night. You can easily identify your catch by the "whiskers" from which it gets its name and by the fact that it has no scales. The fins are armed with sharp spines which can cause painful injuries unless the fisherman is careful.

Today in many of the fresh-waters of Maryland, especially in artificial lakes the largest and one of the commonest fishes is an immigrant from Europe, the carp. Unlike most of the other fishes we have discussed, the carp is mostly an eater of plants. It roots about on the bottom stirring up the mud and destroying the water weeds, so that it often makes the places in which it lives unsuitable for other fish. Not only does it drive out game fishes, but it is not itself very satisfactory to fishermen in Maryland, though elsewhere it is considered an important food fish. This oversize cousin of the little minnows has one good point: it can live in streams which are too polluted for other fish. Unfortunately, this condition exists in a number of Maryland streams, for sewage and industrial waste materials have made many of them unpleasant places of foul odors and very little life. Even the carp cannot live in some of these streams. How much better it would be if we could treat our waste materials in the proper way and enjoy clear waters and the great sport of fishing.



CARP

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Wherefore did Nature pour her bounties forth
With such a full and unwithdrawing hand,
Covering the earth with odours, fruits, and flocks,
Thronging the seas with spawn innumerable,
But all to please, and sate the curious taste?

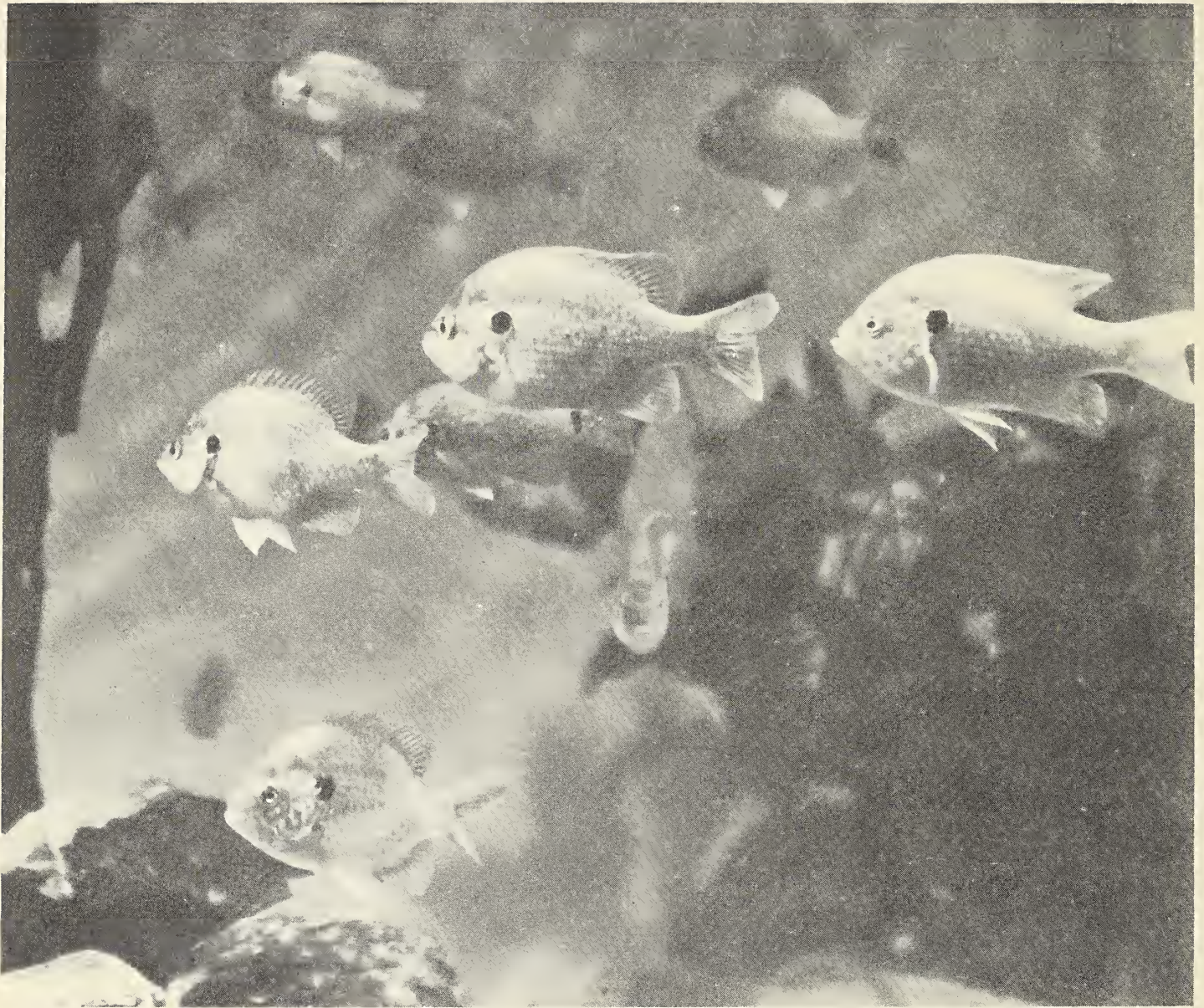
-Milton, Comus



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BLUE GILL SUNFISH

*Photographed by
Edmund B. Fladung Jr..*

THE IMPORTANCE OF MINOR FISHES

by

D.R.CRAWFORD, Sr.

Sportsmen and commercial fishermen are apt to be impatient with the so-called worthless fishes. Since such fishes are not good to eat nor furnish sport in catching them, what value do they have? Why not destroy them at every opportunity? At first glance it appears reasonable to suppose that the presence of undesirable species is to be prevented whenever and wherever possible. However, the more we study fishes, the more we realize that the obscure fishes have a very important place in the economy of Nature.

At present, sportsmen are eager to stock all available waters with game fishes of all sorts. Have these men given any thought to the food supply of the game fishes? What, for instance, do bass and trout eat, and how much food will be required to allow the fish to reach large size? What do young fishes eat?

There are various ways of obtaining information as to what fishes eat. We can watch the fish under natural conditions and try to see what they eat, but such observations are difficult and the conclusions drawn are usually very erroneous. A more certain way is to examine the stomach contents of the fish.

It is perhaps well known that all game fishes will take a live bait, or something resembling a live bait in appearance or actions, and that live minnows are very frequently used for bait. Why are such baits so successful?

When the stomach contents of large numbers of game fishes are examined, the conclusion reached is that small fishes of all sorts make up a large part of the diet of the larger game fishes. It is this predaceous habit that makes the game fish what it is. If this is the case, how can the permanent stocking of any body of water with such fish be successful unless there is an abundance of smaller fishes to furnish the food supply?

There is frequent complaint that many bodies of water contain small game fishes and the fault is said to be due to degeneration of the stock. Let us consider this proposition. There are numerous lakes and ponds throughout the United States which have been caused by glacial action and in which fish have existed since post glacial times. It is known that in some cases such lakes contain an abundance of fishes and that individuals are large for the species. For example, Sebago Lake in the state of Maine contains smelts and salmon which were noted for their size. Since access to the sea from this lake has been blocked for hundreds of thousands of years, during which time no new additions to the fish stock was possible, it is reasonable to suppose that degeneration of the brood stock would have taken place. Comparison of the land locked smelts and salmon with marine forms of the same species shows that there has been no decrease in size.

Instances are known where ponds contain black bass mature at only a pound in weight. Yet the same species reaches a weight of 15 pounds in Florida. Trout in swift streams rarely, if ever, reach a size as large as the same species in a large lake.

Now if we examine all of the cases where the average size of the fish is small with all of the cases where the average size of the fish is large, we find that the small size and large numbers usually go together and that where there are large fish they are usually few in number. Sometimes this is not so, but we shall examine these apparent exceptions later.

Why should a crowded condition be accompanied by small size? Many careful experiments have shown that the rapidity of growth and ultimate size of the fish depend directly on the amount of food supplied to the fish. This is obvious when we compare landlocked chinook salmon with specimens of the same species and age from the sea. Where large numbers of fish occur in a rather limited body of water the food supply must inevitably be reduced to the quantity which is just sufficient to maintain the lives of the fish, without producing rapid growth. When such a balance has been reached the numbers of fishes will not increase, nor will any of the individuals reach a large size. The natural food supply will be just sufficient for a definite number of fish. If more than this number of fish are added to the population they must either starve to death or the whole stock decrease in size. In other words, there is a very definite relation between the total bulk of fish and the total bulk of natural food.

If we destroy such a balance either by reducing the number of fish or adding to the food supply the result will be an increase in the size of the fish. Where there is a very abundant natural food supply we may obtain large numbers of large fish in a limited area under natural conditions, but introduction of additional fishes may result in reduction of size although the food supply is unimpaired.

It is found that where game fishes are large and abundant there are also many small fishes such as minnows, darters, bullheads, and the young of suckers, chubs, etc. This relationship is too significant to overlook. Knowing that game fish subsist largely on smaller fishes and that to obtain large size a game fish must have abundant food, it is hard to understand why so little thought is given to the source of this food. It is not too much to say that without small minnows and the young of other fishes we would not have large game fish in our lakes. The young of the sucker and minnows are hatched at a time when fingerling trout would find them most acceptable as food.

It has not yet been shown that the presence of suckers, chubs, or minnows has resulted in reduction of trout or other game fishes. Under observation in aquaria it has been noted that these fishes eat materials which are not touched by any game fish. The conclusion is reached that these fishes do not compete with the game fish in food supply. These fishes are generally considered as enemies of the trout and bass, but proof is lacking that this is the case. Therefore, the policy of destroying these fish is a short-sighted one.

Considering that an abundance of sport fish is desirable and that more

sport is obtained with large fish than with small fish, the best results are obtained by seeing to it that the food supply is maintained and increased in waters into which sport fishes are placed. It is submitted that the native suckers, chubs and minnows supply this demand and that without them successful stocking of waters with large game fish will not be permanently successful.

The quantity of food which a trout requires to maintain its existence without much growth is known to be about 1.5 per cent of the weight of the fish in dry food per day. Since small fish usually contain 40 - 60 percent water, the actual weight of food eaten would be greater than 1.5 per cent of the weight of the trout. Thus, a two pound trout will require at least 0.08 of a pound of dry food a day, or in 100 days it will consume eight pounds of food. If the fish is to increase in size probably ten pounds of food will be required. Actually, the amount consumed may be more than this. Under observation, six cutthroat trout whose aggregate weight was about one pound actually ate a pound of meat a day. From this it can be seen that 100,000 two pound trout, in the course of a summer will require a minimum of 400 tons of wet or live food. Bass require fully as much.

From the foregoing an idea may be obtained of the futility of stocking small ponds with large numbers of bass without adequate provision for food supply. The natural and most certain method is to introduce small fishes which will reproduce abundantly and thrive on food materials which the bass cannot use.

BIRD-BANDING NOTES - 1948

by

IRVING E. HAMPE

I began banding birds early in February, 1948 at my home on Ashbourne Road in Arbutus, a suburb of Baltimore. The banding station is located on the end of a lot 50 x 225 feet. A small stream flows past the end of the lot. This area has been recently developed as a residential section and has very few trees of large size except along the stream. Cover is lacking in winter and birds are scarce, the starling excepted, until the spring migration begins. With the budding of shrubs and trees the birds move in and the breeding forms take up territory along the creek. Later in the spring when the foliage is dense, robins and catbirds breed close to the houses.

Banding was slow in the early spring; better results were obtained later in the year as more traps were used, following close study of the birds' reactions to bait and location of traps. The following accounts by species will give some idea of the problems that arose and the results accomplished.

The starling (*Sturnus vulgaris*) was the first and the most easily captured species. The large wintering flocks descended to the traps without hesitation and were easily caught in a drop trap. Small automatic traps, the type that drop the door when the bird steps on a false floor, were occasionally successful, but the starlings usually landed on top of the trap door and the vibration released the trap. Starlings drove the smaller

species from the feeding station and were themselves driven off by the grackles. Starling flocks fed about the area until late March. An occasional adult bird and a few immatures were taken throughout the summer. During July large flocks of immatures were observed and a few trapped. By the middle of August large flocks of adults were again in evidence. Birds in molt from immature to adult plumage were trapped as late as the middle of October. Forty-seven individuals were banded; the number could have been larger but many were not disturbed when other species were near the traps. None of the banded starlings was retrapped.

An interesting starling was trapped on October 31. It had one white tail feather and the corresponding upper and lower tail coverts were white. (See Drawing)

The most common breeding bird along the creek was the song sparrow, (*Melospiza melodia*). The first song sparrow was banded on February 7. The monthly totals were as follows: February, 1 adult; April, 2 adults; June, 1 adult, 1 immature, 3 nestlings; July, 2 adults, 16 immatures; August, 12 adults, 14 immatures; September, 4 adults, 8 immatures. A total of 64 individuals.

A total of 29 individuals, which were color banded, furnished a large percentage of repeats. A nestling banded on July 27, a day before it left the nest, repeated continuously until August 14 when it disappeared from the area. One of the parent birds of this nestling was first banded on April 4. The nestling was one of a second brood, for the adult was observed feeding grown young earlier in the season.

Song sparrows varied considerably in their behavior during trapping. Some individuals fought viciously every time they were trapped, but these were the ones that repeated often. Molt in this species began in the latter part of July. Wing, tail, and contour feathers were molted in succession in adults. The immature birds had only begun to molt their wing feathers. Only one immature had any indication of molt other than wing feathers; an individual trapped on September 29 had partially completed the wing molt, and feathers in the crown were in sheaths, the rest of the plumage being old and worn. All the banded birds had disappeared by the end of September.

One mockingbird (*Mimus polyglottos*) was trapped and banded on May 15. This bird fought and screeched continuously while being banded. A color band was placed on its leg before it was released and a number of observations were made of this bird throughout the year though it never again came near the traps. Two young mockingbirds appeared in the yard later in the season when the grapes were ripe but did not seem interested in the food in the traps.

It was late in May before the first catbird (*Dumetella carolinensis*) appeared at the banding station. Twelve individuals were banded during the year and nine of these were color banded. The color-banded birds were evidently breeding nearby as they continued to appear until late September. When grapes were ripe a number of these birds were observed every day. At this time they never approached the traps unless a handful of ripe grapes was placed inside.

Early in July the plumage of the catbirds began to show signs of wear. By the middle of August every bird trapped was molting and dropped a lot of feathers during banding operations. All the color-banded birds that were observed in September had completed the molt.

Although most of the birds trapped were on their nesting territory no nests were found. The wet season evidently was disastrous to this species as well as many other small birds in this vicinity. Only two birds trapped were definitely known to be birds of the year.

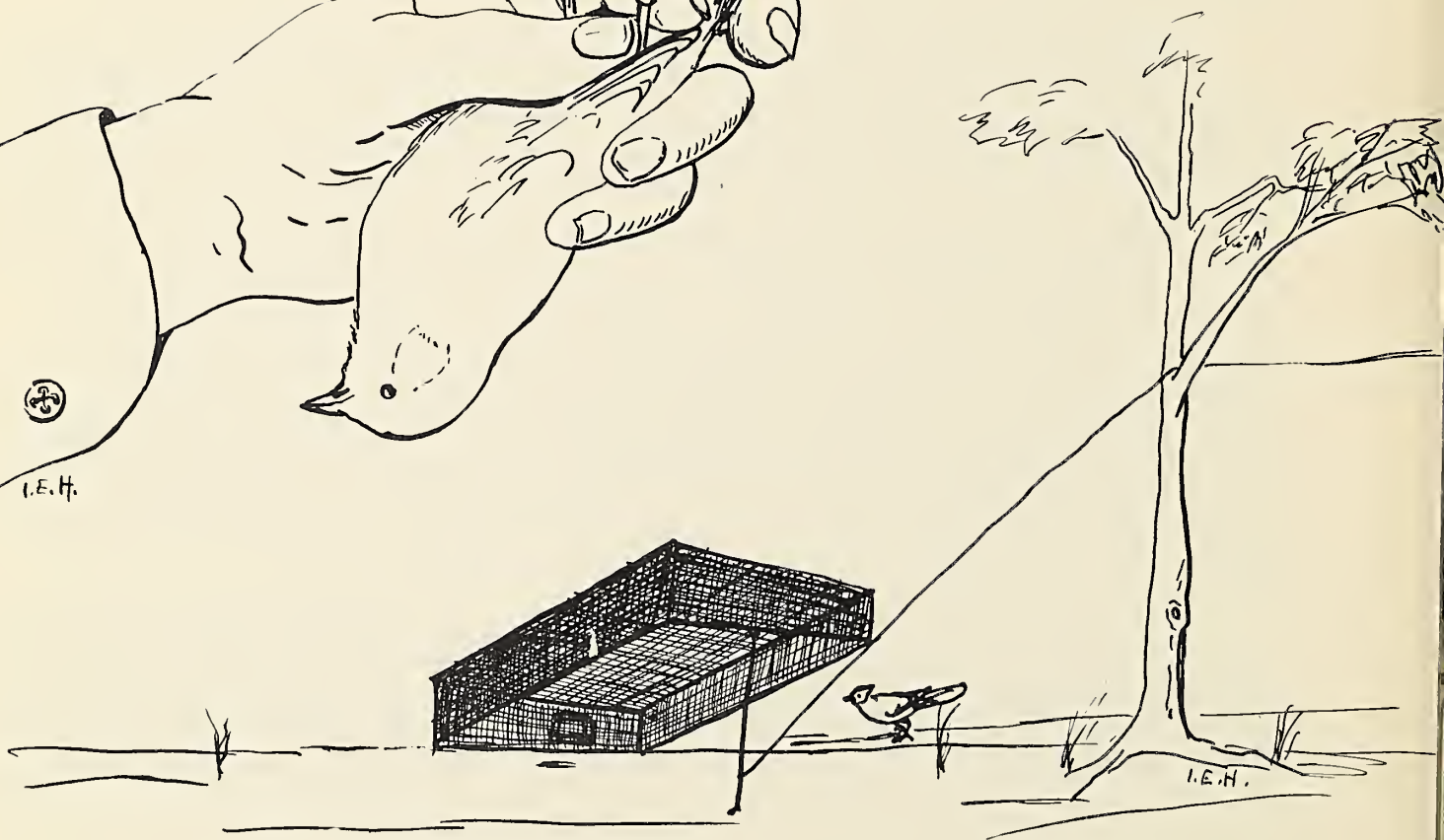
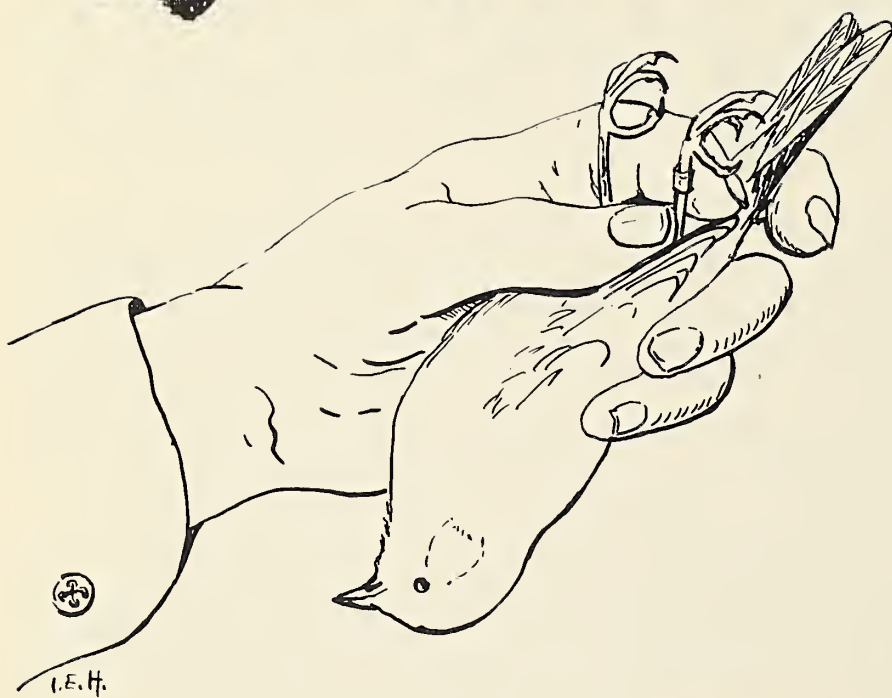
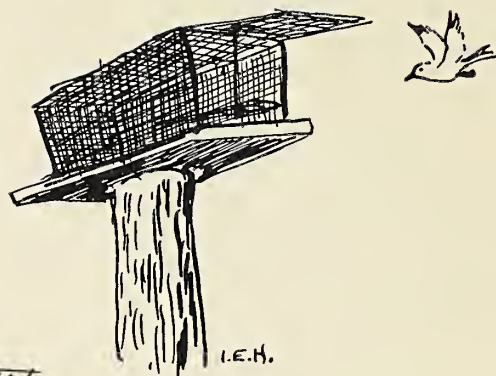
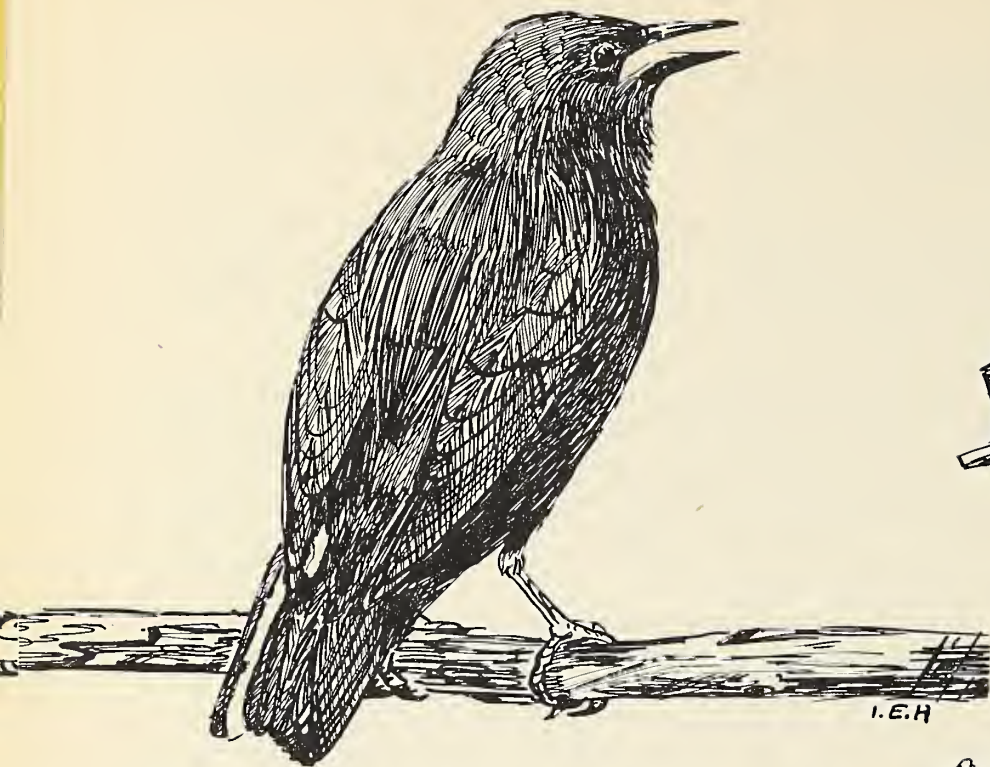
The only birds banded away from the station by the writer were four nestling red-shouldered hawks (*Buteo lineatus*). The nest was discovered in a large sycamore tree near the Patāpsco River below Relay, Maryland, on April 25. Mr. Robert M. Bowen climbed the tree on May 23 and lowered the young down to be banded and photographed. They left the nest before our visit one week later.

The familiar robin (*Turdus migratorius*) appeared at the station on February 28, but it was May 23 before one was banded. The first banded, a nestling, was the only survivor of a nest that had four eggs on May 4. Three young hatched on May 15 early in the morning; the fourth egg failed to hatch and disappeared from the nest. During the rainy period that followed one young died and one fell out of the nest. The remaining nestling left the nest on May 27. One of the parents of this bird was trapped and color banded. The pair successfully raised a brood of three young in July. At this time the color-banded bird was observed in molt. Most of the tail feathers were gone and wing feathers were being renewed.

Robins were very difficult to trap during the early part of the season but when feeding young they began to frequent the traps. Young robins just out of the nest occasionally walked into the traps but did not repeat. Migrant robins fed about the station but were very shy and only a few were trapped. Nine birds were banded during the year, eight of them with colored bands.

Another species that was difficult to band early in the season was the purple grackle (*Quiscalus quiscula*). A total of 25 was banded during the season, 14 immatures and 11 adults. Grackles did not breed near the station but were daily visitors from February 29 to late September. The first bird trapped was banded on June 26. From that date on nearly every individual taken was molting. The wing coverts and secondary flight feathers seemed to be the first feathers lost and renewed. During the latter part of the season many of the immature birds had new flight feathers and patches of new feathers on breast and rump with the rest of the plumage ragged. The new feathers were bright with iridescent colors and made quite a contrast to the old feathers. None of the birds banded have been retrapped this year.

The wariest of all the birds trapped was the cardinal (*Richmondia cardinalis*). A pair had been present in the vicinity of the banding station since early spring. On July 11 the female was trapped and banded. The male was caught two days later. Both were color banded to facilitate observation. They were frequently observed until September 9. No signs of nests or young



were observed. Both birds were very pugnacious when trapped and fought viciously until released.

Two house wrens (*Troglodytes aedon*) were banded, one on August 17 and another on September 16. No wrens were observed in the vicinity earlier, and these two birds left the area soon after being banded.

A few cowbirds (*Molothrus ater*) visited the station along with the flocks of starlings in the fall. An adult male was banded on October 24 and an immature male molting into its first winter plumage was banded on October 31.

The last bird banded this year was a tufted titmouse (*Parus bicolor*). A pair had been observed around the feeding tray early in December and one was trapped on December 5. This bird did not like being handled and pecked while being banded. When released it joined the unbanded bird and both flew away. They have not been observed since.

Two hundred and nineteen chimney swifts (*Chaetura pelagica*) were banded for the writer by Stephen Simon and Compton Crook. They built a swift trap and placed it over a chimney on St. Stephens Church in Stoneleigh. Early in the morning of September 11 a group of bird students assembled and helped to band the swifts. This is, to my knowledge, the first large scale banding of chimney swifts in the vicinity of Baltimore and thanks are due to Mr. Simon who built the trap and Mr. Crook, an experienced bander, who assisted in banding the birds.

In summary, a total of 388 birds of 12 species was banded during the year. Color bands were placed on 60 of these birds (7 species) to make sight records and behavior studies possible.

FERNS FOR DRY WOODLAND OR SHADY GARDENS Facing
South, Southwest, Southeast
(especially compiled for climatic conditions in Maryland)
by
Andrew Simon

The ferns in the list given below are all very hardy and with a reasonable amount of care should grow and spread almost indefinitely. It will lend to their vigor to divide and replant them in fresh earth mixture when a stand is spreading. This should be done in September and October to give the plants a chance for root growth before extreme cold weather. Neither marginal nor wood-toothed ferns can be propagated from division, but new plants come from spores.

Ferns will grow well under most trees with the exception of Norway maple and black walnut. The leaves of these varieties should not be used for mulch or covering because of their extremely toxic action. For winter care allow all existing leaves to remain around the fern colonies (except the maple and walnut leaves). If the collection of leaves is not very heavy use extra oak

leaves. Be careful never to cover the crowns of the plants. Evergreen boughs are very good for using as a winter cover.

The best time to plant ferns is in April, September, and October. Potted plants may be planted over a longer season, all but midsummer and midwinter. Plant them in a mixture of one-half topsoil, one-quarter bank sand, and one-quarter leafmold or peat moss.

For summer care ferns should have a heavy mulch of oak leafmold or peat moss of at least one inch, in addition to the mulch used for winter covering. During a dry period, especially during the first year after planting, they should have at least one good soaking of water each week, applied in the late afternoon or early evening.

Ferns should always have a generous mulch of leafmold or peat moss of at least two or two and one-half inches. Never fertilize, but decayed oak leaves and pine needles are good to mix with the peat moss or leafmold for acidity.

EVERGREEN FERNs

<i>Dryopteris marginalis</i>	Marginal woodfern
<i>Dryopteris spinulosa</i>	Toothed woodfern
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Asplenium platyneuron</i>	Brownstem spleenwort
<i>Polypodium virginianum</i>	Common polypody fern

DECIDUOUS FERNs

<i>Phegopteris hexagonoptera</i>	Southern beechfern, broad beechfern
<i>Thelypteris noveboracensis</i>	New York fern, tapering fern
<i>Athyrium asplenoides</i>	Southern lady fern
<i>Osmunda claytoniana</i>	Interrupted fern
<i>Woodsia obtusa</i>	Common woodsia

It should be noted, however, that the following ferns should never be planted with those listed above, as they are of such rapid growth that they will smother all other ferns in a few years.

<i>Dennstaedtia punctilobula</i>	Hay-scented fern
<i>Pteridium aquilinum</i>	Eastern bracken
<i>Onoclea sensibilis</i>	Bead or sensitive fern

Ferns need little care, except the mulching as described. They will add beauty and satisfaction to shaded corners in a lawn or in more extensive wooded area.

NOTES FROM FIELD AND LABORATORY

GROWTH OF BRASENIA FROM WINTER BUDS



The water shield, *Brasenia*, is very common and usually abundant in freshwater ponds throughout the United States and Canada. It has been recorded also from tropical America, West Africa, and Australia.

Brasenia sometimes blooms and produces a fruit, but a very common way of propagation is by means of a running rootstock, new plants developing at the nodes. There is another method of propagation which is not so well known. If the rootstocks are raked up late in the fall, the winter buds, or hibernacula, will be found. These hibernacula are very compact leaves on short, thick stems, and they are covered with a thick coating of mucus. In color, they are very dark brown or purple. During handling, small

bunches will break off at definite places where a cleavage plane has been prepared. The ease with which the winter buds can be separated from the old rootstock suggests that they may become widely scattered over the bottom, thus allowing the plant to spread.

When winter buds were planted in aquaria, several variations in the manner in which the floating leaf reached the surface were noted. New growth did not start until after a resting period of about six weeks, which was not shortened by raising the temperature of the water or by intensifying the light. After this resting time new buds developed from which grew small green leaves. The new growth is accompanied by a decay of the dark-colored leaves, which suggests that they were storage places for food. New growth can be retarded indefinitely by excluding sunlight.

The first green leaves increase very little in size, but later on, much larger submerged leaves develop with short, thick stems. A new branch starts close to the leaf and a long stem rapidly grows toward the surface of the water where the floating leaf is developed to its full size. The stems in this case do not have submerged leaves. Sometimes a single stem starts directly from the prone stock of the hibernaculum and reaches the surface of the water very rapidly, carrying with it a terminal bud which later expands into the floating leaf.

Another way in which a floating leaf reaches the surface is as follows. A new stem will grow rapidly for a few inches and develop a small leaf at the tip. A new branch starts close to the leaf and grows to a short length where another small leaf develops. This process is repeated until the surface of the water

is reached. The submerged leaves do not increase in size, but finally decay, thus leaving a single stem supporting a single floating leaf.

A very different growth was observed when winter buds were planted in small globular aquaria (goldfish bowls). Instead of developing one or two long stems which terminated in a floating leaf, a large number of short stems grew from the hibernaculum, each with a small, nasturtium-like leaf at its end. These stems extended toward the side of the aquarium in all directions, suggesting a reaction to light. It is pointed out in this connection that other and diverse results might be obtained under different lighting conditions and that *Brasenia* may be a very interesting subject for experiment.

D. R. Crawford

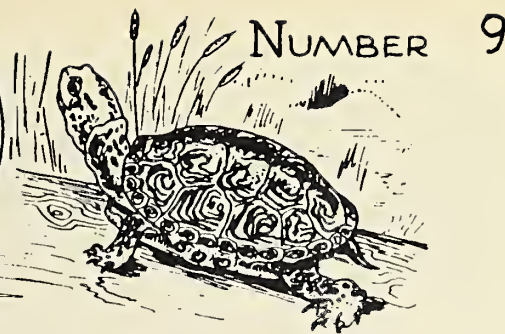
Two Robins Laying in the Same Nest

In front of my home in Dorchester County we have a pump and over it is a shed to keep off the rays of the sun. This shed is of lattice work of which two sides are mostly open. During the spring of 1919, two robins (*Turdus migratorius*) started nests on the plates directly under the roof at about the same time. One nest was on the east side and the other on the west side. Both nests were apparently completed at the same time. Strange to say, the female which built the nest in the west end either disliked it after finishing or else she got confused, for no eggs were laid in it. On the other hand, eggs were deposited in the east nest at the rate of two a day. The following table will show how many eggs were in the nest at various times and it will be noticed that one egg disappeared on the 23rd of April.

April 20	5 p.m.	1 egg
April 21	8 a.m.	3 eggs
April 22	8 a.m.	4 eggs
April 22	8 p.m.	5 eggs
April 23	10 a.m.	6 eggs
April 23	11:45 a.m.	5 eggs
April 23	5 p.m.	6 eggs
April 24	7 a.m.	6 eggs
April 25	7 a.m.	7 eggs
April 25	7 p.m.	7 eggs
April 26	7 a.m.	7 eggs

The nest was deserted after the laying of the seventh egg. Inasmuch as persons were constantly going to the pump after water, this was probably the cause for the abandonment.

Ralph W. Jackson



NUMBER 9

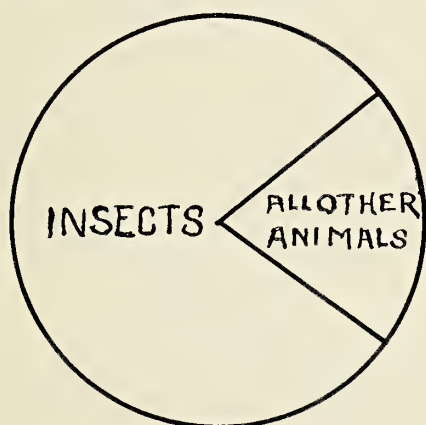
MARYLAND NATURE LEAFLET

COMMON MARYLAND INSECTS

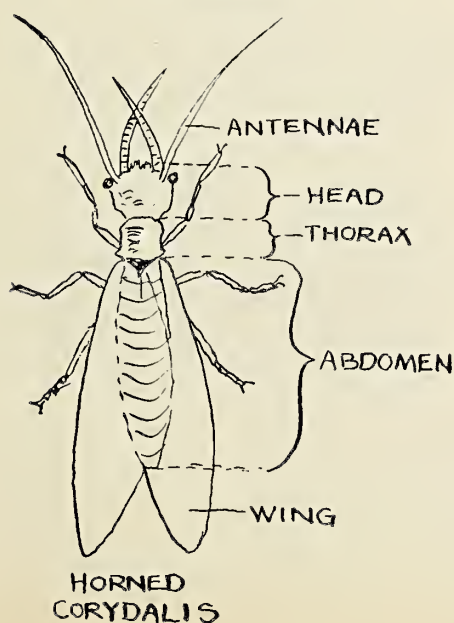
by

EDMUND B. FLADUNG

Wherever you may go in Maryland you will find insects. It is not necessary to take long hikes to explore this kind of wildlife, for insects are always with us. In summer they are everywhere and much attention must be given to the problem of keeping them from becoming too numerous. In winter many species are dormant but flies and crickets may buzz or chirp in our school-rooms, small insects may be found hidden away in cracks and crevices, and some may be on the old dog or cat which lies on the rug at home.



As our graph shows, there are more kinds of insects than there are kinds of all other animals combined. Almost a million kinds have been described by scientists; no one has ever counted the number of kinds in Maryland, but it is certainly very great. A whole lifetime would not be enough to become acquainted with all the Maryland insects, so in this leaflet we are introducing only some of the most important groups; later leaflets will discuss some of the groups in detail.



What is an insect? An insect is a small animal without a backbone. It has its skeleton on the outside of its body like the shell of a crab or crayfish. It has three main divisions to its body as shown in our illustration. Adults have three pairs of walking legs. Spiders, which have four pairs of walking legs and crayfish which have five pairs, are not insects.

In developing from the egg to the adult form, insects pass through a series of changes called *metamorphosis*. In general there are two kinds of metamorphosis: complete and incomplete. In an incomplete metamorphosis the insect which hatches from the egg looks much

like a miniature adult except that it has no wings. These young insects, called *nymphs*, grow gradually to adult size, the wings appearing from beneath the skin when the skin is shed for the last time. Grasshoppers, crickets, dragonflies and the true bugs are examples of insects with incomplete metamorphosis. In complete metamorphosis the young insect as hatched from the egg does not look at all like the adult but is rather worm-like; it is called a *larva*. When the young insect reaches a certain size it goes into a resting stage called the *pupa*. Although the pupa seems to be lifeless a great change goes on inside it, so that when the adult insect comes out it has no resemblance to the larva. Beetles, flies, bees, moths, and butterflies are examples of insects with complete metamorphosis.



BEETLE

The *beetles* form the largest group of insects. They are found everywhere, on land and in the water; in trees, shrubs and plants and in the soil; in dead wood and under rocks. Some of the beetles are among our most brilliantly colored insects, but since they do not fly around as actively as butterflies they do not attract as much attention.

Beetles have four wings; but the first pair or fore wings are greatly thickened, forming a pair of hard "wing covers" beneath which the thin hind wings are folded. It is the hind wings which are used in flight.

A notable example of a beneficial beetle is our ladybug, a little red beetle with black dots on its back. The ladybug preys on other small insects, especially plant lice, which are harmful to our crops and so it aids us in our fight against these pests. Other beetles, like the potato bug, the asparagus beetle, the Mexican bean beetle, and the Japanese beetle, are great destroyers of plant life and cost farmers millions of dollars in damage each year. Fireflies are some of the most interesting and attractive of our beetles. Everyone has seen them lighting up the summer evenings! Some wingless forms also give light. These are called glow worms.



CRANE-FLY

The *flies* form another large group of insects. They may be distinguished from other insects by the fact that they have only two wings. Some insects which are called "flies" such as the dragonflies and sawflies do not belong to this group. But there are also many insects in this group which are not ordinarily called flies; for example, gnats and midges.

Everyone knows the housefly and most people are familiar with its part in spreading disease. Other flies such as the horseflies and deerflies annoy us by their bites. Perhaps the worst pests from this point of view, particularly in the tidewater part of Maryland, are the mosquitoes which are also members of the fly group. Fortunately Maryland mosquitoes are not dangerous as disease carriers which are farther south, especially in the tropics.

The *butterflies and moths* are usually considered the most attractive insects. While the beautiful winged adults are quite harmless, many of the larvae are among our most injurious insects. Two illustrated pamphlets on these Maryland insects have been published by the Natural History Society of Maryland: "Familiar Butterflies of Maryland" and "Familiar Moths of Maryland".

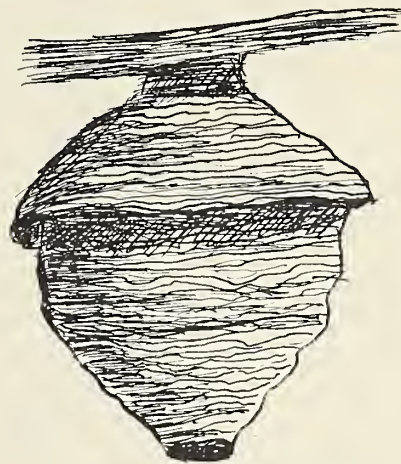


WASP

The *bees*, *wasps*, and *ants* all belong to the same group. The adults have two pairs of rather small wings which are transparent and held together by tiny hooks when the insects are in flight. Most of the bees and ants and some of the wasps live in colonies and are therefore known as social insects. The members of a colony are generally of three different types: workers, drones, and a queen. The workers not only build the hive or combs in which the

colony lives, but in many cases act as soldiers and fight to protect the queen and the hive. The drones are the males which are present in the hive during the early summer after which they die or are killed by the workers. The queen supplies the eggs to keep the colony alive.

From the honey bee we receive honey and wax. The honey and wax are made by the bees for their own use during winter but as they often make more than they need, the beekeeper collects the excess for himself. The wasps build several kinds of nests or houses. There is one that builds its home of mud and is known as a mud-dauber; another manufactures a substance resembling paper and is known as the paper wasp. It has been said that the idea of making paper was first conceived by man from the nests of the paper wasps. Ants generally live in dead trees or in the ground where they sometimes heap up large mounds known as ant hills. There are some bees and wasps that live by themselves and are therefore known as solitary wasps or bees.



WASP NEST

All the true stinging insects belong to this group. Because of their ability to sting, the bees, wasps and hornets are rather unpopular, but without them many of our fruits and other crops would not be successful, for these insects are among the most important pollinators of flowers.



LONG-HORNED GRASSHOPPER

The *grasshopper* group contains a number of familiar insects many of which do not look much alike. Most, however, have two pairs of wings of which the front pair is leathery and of little use in flight while the hind pair is thin and light. When the insect is at rest, the hind wings are folded up like a fan under the protection of the front pair.

To this large group belong the cockroaches, crickets, katydids, mantids, and true locusts (short-horned grasshoppers). Everyone has read or heard about the locust plagues which have often destroyed miles upon miles of crops. Not even a blade of grass is left remaining when such a horde of locusts have gone from a place. Even moderate numbers of locusts and grasshoppers can be very



KATYDID

destructive. The cockroach is another example of a destructive insect. It eats almost anything; consequently most anything is liable to be attacked by this insect, of which there are a number of species. The praying mantis is an exception to the general harmful tendencies of this group. It is one of man's best friends in the insect world, as it preys on a great variety of other insects, many of them harmful. The katydids and crickets are easily recognized by their song which we hear in the late



CRICKET

summer and fall.



STINK BUG

bedbugs are parasites on warm-blooded animals: man himself may furnish them with a meal. Closely related to these true bugs and having the same kind of mouth parts are the leafhoppers, aphids and cicadas. The cicadas (sometimes wrongly called "locusts") are one of the chief musicians of the insect orchestra which enlivens our summer evenings. The

To most people any insect is a bug. But to the entomologist (the scientist who studies insects) the *true bugs* are insects with mouth parts especially formed into piercing-sucking organs. Some of the members of this group live on plant juices while some prey on other animals, sucking out their blood or body juices. The squashbug and stinkbugs live on plants and are often harmful to man's crops. The

seventeen-year "locust" has an interesting story on which a leaflet can be obtained from the Natural History Society.

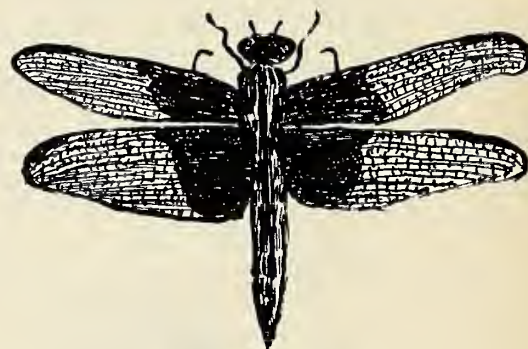
Both the *dragonflies* and *damselflies* should be classified as good friends of man, since they prey upon other insects, mostly small flies and mosquito larvae. These insects are generally found in the vicinity of water. Many of them are very large for Maryland insects and some have fine, bright coloration. The adult lays her eggs in some shallow stream or in reeds growing on the edge of a pond. The nymph stage is spent in the water.



WATER-STRIDER



CICADA



DRAGON FLY

Insects are generally thought to be very harmful to man's interests. Undoubtedly many are very destructive but the reader of this leaflet has seen that many others are quite useful; some - the pollinators of flowers - are, indeed, necessary. Perhaps the largest number of insects are neither helpful nor harmful. Certainly it is always dangerous to judge any group by the actions of a few of its members.

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AMERICAN
BISON

Photograph by
EDMUND B. FLADUNG

MARYLAND NATURALIST

The Natural History Society of Maryland

WINTER-SPRING 1950 VOLUME XX Nos. 1 & 2



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EDITORIAL

To the minds of many all endings are sad, for termination of whatever sort is always a reminder of the transitory nature of our own human existence.

Deeper, however, than this general feeling is the melancholy associated with the extinction of some species of living thing. For every kind of plant or animal is the result of eons of development, myriads of adjustments under the buffeting of environment, unnumbered victories in the struggle with competitors. Extinction is the end of a long road; and in the living world we know the same road is not traveled twice.

Yet extinction is a necessary part of evolution as death is a necessary part of the individual life. The forest seedling cannot unfold its capabilities unless some old tree dies, so also the extinction of old species permits the rise of new. It is the evershifting cast of characters which lends so much drama to the science of paleontology. But the kind of extinction or extirpation described in the present double number of the *Maryland Naturalist* is different. Wherever man has exterminated organic species, there has been only loss. Variety decreases, man imposes a neat but comparatively monotonous uniformity. The fauna and flora of cities, the ultimate in human habitat creation, are remarkably similar on all continents and in all climates.

Much of this extermination is inevitable, some may even be desirable, but all of it is impoverishing. Who would say that the rat is a fair exchange for the cougar or that an increase in the number of rabbits is adequate repayment for the destruction of our wapiti? As we read Mr. Mansueti's documentation of Maryland's loss we can resolve to do our best to preserve what remains to us both within our State and in North America as a whole.

H.K.



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Maryland Mammals



AMERICAN BISON
(Extirpated.)

DRAWING BY ERNEST E.
THOMPSON. FROM
HORNADAY'S EXTERMINATION
OF THE AMERICAN BISON.

PLATE I

E X T I N C T A N D V A N I S H I N G
M A M M A L S O F M A R Y L A N D
A N D D I S T R I C T O F C O L U M B I A

By Romeo Mansueti

When Giovanni da Verrazzano (1524), Bartholomew Gilbert (1603), and the famed Captain John Smith (1608), first explored the shores of Maryland, spectacular creatures not to be encountered today dwelt in the hugh forests and waterways. These creatures are now a thing of Maryland's past, the indirect result of man's conquest of the new continent.

What beasts occurred within the present confines of the State before the white man's arrival will always be a hazy mystery to even the most erudite historian and naturalist. The reason for this, of course, is the paucity of fossil or skeletal remains of the animals, and the lack of adequate written record from the aborigines. From varied and remote sources a mosaic picture may be assembled of the extirpated recent mammals or those that are slowly vanishing from our landscape and waters.

Such mammals as the bison, cougar, wolf, wapiti, and marten roamed over many of our most familiar landmarks within memory of man's settling of the American continent. Paleontologists have been able to demonstrate that before them still stranger and more grotesque beasts such as mastodon, saber-tooth cat, tapir, horse, peccary, and other mammals closely or remotely related to those we know today, also inhabited what is now Maryland. Such records are available in the writings of Gidley and Gazin (1938), Hay (1920, 1923), Gidley (1913a, 1913b, 1920a, 1920b, 1933), Oler (1937), Lucas (1906a, 1906b). Still further back in the pages of prehistoric romance were such reptiles as dinosaurs, of which an excellent review has been presented by Vokes (1949), fossil turtles, which Hay (1908) and Collins and Lynn (1936) have studied adequately, and fossil invertebrates which have been studied in great detail. (See Schuchert (1903), and Case (1904).

It is generally well known that animals soon diminish in numbers with the encroachment of civilization; even today the Maryland countryside is a visible laboratory for such a change. The pioneering activities of early Marylanders destroyed the habitats of many native animals, slowly exterminating local populations or forcing them to emigrate to greener pastures which soon also suffered the ravages of man. This insidious type of extermination which man must, of necessity, force upon the fauna of a newly settled region, might easily be interpreted as nature's way of demonstrating active competition for survival in a dynamic world. Obviously, there is no compromise under such conditions.

Handley and Patton (1947), in speaking of the extinction of mammals in Virginia, have expressed the philosophy of the ever-changing nature of the biological domain: "Though it is regrettable that man has had a hand in the

extinction of these creatures, he is not to be blamed too much, for the ascendancy of one species and the extinction of another is a regular process of nature which has been repeated over and over again all down through the ages. Probably man did not have much or anything to do with the disappearance of the vast numbers of wild horses, mammoths, mastodons, tapirs, wild pigs, ground sloths, and camels which roamed our lands, but they are gone nevertheless. As surely as a species of animal comes into being, it is destined for eventual extinction, whether by geologic catastrophies such as volcanic eruptions or earthquakes, or by great climatic changes evolving vast spreading glaciers or desert wastes, or by the hand of man. Our geologists have given us proof of all this by the fossil record in the rocks."

The most notable series of recollections and observations on the wild mammals which occurred in Maryland during the 17th century have been extracted from the writings of early visitors to Maryland. Although Verrazzano visited the lower Eastern Shore in the early 16th century, he left no account of the natural resources. Captain John Smith, who visited what is now the District of Columbia, reported that "... on the 16 of June [1608] we fell with the river Patowomek [Potomac]. *** Having gone so high as we could with the bote ["this of course means to Little Falls." McAtee (1918)] we met diuers Saluages in Conowes, well loaded with the flesh of Beares, Deere, and other beasts, whereof we had part." Captain Smith also mentioned, "a few Beauers, Otters, Beares, Martins and Minks we found."

Another early account of wildlife in Maryland is recorded by Joel A. Allen (1876). "Father Andrew White, in describing Maryland in [1633], says 'But so great is the abundance of swine and deer that they are rather troublesome than advantageous. Cows also are innumerable, oxen suitable for bearing burdens or for food; besides five other kinds of large beasts unknown to us, which our neighbors submit to their table. Sheep will have to be taken hence or from the Canaries; asses also, and mules and horses. The neighboring forests are full of wild bulls and heifers of which five hundred or six hundred thousand* are carried to Saville from that part which lies toward New Mexico.

*Whether these are domestic cattle, the number of which seems extraordinarily high, or whether they represent bison, will probably never be ascertained. Father Andrew White apparently did not visit Maryland until sometime after 1633. The preceding account is considered an assemblage of facts about Maryland and America in general, for the purpose of attracting settlers, gathered from the reports of explorers and published accounts. Father White's account of Maryland was published originally in Latin. Later several translations appeared, all of them varying in one way or another so that important facts are often distorted and difficult to comprehend. George Calvert also published an article about the natural resources of Maryland and all of it seems to have been copied from Father White's original Latin version. Since Father White recorded a large number of important animals, the occurrence of some of which are controversial, as well as other natural resources his account must be studied carefully. Inaccuracies were probably inadvertent and resulted from Father White's exuberance and intense interest in the New World.

As many deer as you wish can be obtained from the neighboring people. Add to this muskrats, rabbits, beavers, badgers [raccoons], and martens, not however, destructive, as with us, to eggs and hens.' *A Relation of the Colony of the Lord Baron of Baltimore, in Maryland near Virginia, etc.* (Forces Coll. Hist. Tracts. Vol. IV, No. 12, Pp. 6, 7.)

An anonymous writer in 1635, contributor to *A Relation of Maryland*, reprinted in Hall (1910), asserted that "In the upper parts of the Country, there are Bufeloes, Elkes, Lions, Beares, Wolves, and Deare there are in great store in all places that are not too much frequented as also Beavers, Foxes, Otters, and many other sorts of Beasts." Shortly afterward, in 1666, George Alsop, writing in *A Character of the Province of Maryland*, reported that "The three main Commodities this Country affords for Trafique are Tobacco, Furrs, and Flesh. Furrs and skins, as Beavers, Otters, Muskrats, Rackoons, Wildcats, and Elke or Buffeloe, with divers others, which were first made vendible by the Indians of the Country..."

Among the most noteworthy of the written records of Maryland wildlife is the journal of Meshach Browning (1928) who lived in the years 1771-1859. His book, *Forty-Four Years of the Life of a Hunter*, is an extraordinary record of big game in Garrett County, one hundred and fifty years ago. In his day he was noted as a great bear-hunter. It has been estimated that he had killed 300 to 400 bears at Little Crossing, where his home was located in our westernmost county. In addition, he slaughtered from 1800 to 2000 deer, over 50 cougars, and scores of wolves and bobcats. His accounts of encounters with animals are written with great skill considering the fact that he had complained in his old age that he had had no adequate formal education. His exploits have been handed down from generation to generation, and he is almost a legendary figure today in Garrett County, where many of his descendants live.

Cope (1873) prepared the most elaborate essay on the zoology of Maryland. He demonstrated his genius by surveying the entire fauna of the State with great accuracy so that the account must be regarded almost as a classic. Regarding the mammals, he wrote, "The most conspicuous ... are the panther (*Felis concolor*), the wild-cats (*Lynx Canadensis* and *Lynx rufus*), and the black bear (*Ursus Americanus*), ... All of these species are not uncommon in the mountainous portions. Of the Ruminants, the bison (*Bos Americanus*) and the elk (*Cervus Canadensis*), the largest known of the true deer, have been destroyed by human agency. The common deer (*Cariacus Virginianus*) is abundant. Of aquatic carnivora, two species of the seal have been seen on the coast and in the Chesapeake Bay; one of these, the hooded seal (*Cystophora cristata*), has occurred twice in the Chesapeake."

Although seals and whales, as well as other marine mammals must be regarded as stragglers within the political boundaries of Maryland, nevertheless, they are becoming so rare that some species are on the verge of vanishing. Cope also gave one of the most complete accounts of the cetaceans. "Whales are common off the coast. The right whale (*Balaena cisarctica*, Cope) is less so than formerly, but may increase again, as their pursuit is now less vigorous. Finner whales are still more common; a large species (*Sibboldius lectirostris*, Cope) went ashore a few years ago near Berlin, and the *Sibboldius tuberosus* (Cope), a smaller species of forty-five feet in length, has been seen in the

Chesapeake. Other large species are seen, while the smaller forms are more abundant. Black fish (*Globiocephalus*), Killers (*Orca*), and grampus occur. The porpoises (*Delphinus*, several species, and herring-hog, *Phocaena*) are common on the coast and in the Chesapeake Bay. A white whale (*Beluga*) is said to have been caught in the latter, and exhibited in Baltimore."

Scharf (1882), with the aid of Professor Philip R. Uhler, former Librarian of the Peabody Institution of Baltimore, and famed hemipterist of the Maryland Academy of Sciences, presented a general account of Western Maryland: "The native animals of the region have been the black bear, gray wolf, panther, wild-cat, gray and red fox, raccoon, opossum, mink, marten, weasel, field hare, ground hog, skunk, fox-squirrel, gray squirrel, flying squirrel, chipmunk or ground squirrel, common mole, star-nose mole, shrew, white-footed mouse, jumping mouse, and several others of this group, the hoary and two other kinds of bats, the otter, muskrat in the waters, and the common rat and mouse in the barns and houses. The wild beasts have been exterminated, and so have the elk and caribou*, but the red deer is said to be still a casual visitor of the wilder sections near the Potomac River."

Writing about the Blue Ridge belt of Western Maryland, Scharf (1882) quotes Uhler, "The great American elephant at one time roamed over the fertile valleys, while the elk, caribou, [sic], and red deer grazed in the open areas of the forests. Besides those, the bear, panther, wild-cat, gray wolf, ... found a home in one or other parts of this varied region. The beaver especially was formerly abundant here, and built dams across the creek and river. Unhappily, with the increase of population new demands for cleared lands drove away many of the interesting animals, such as the beaver and elk, and the cupidity of thoughtless men caused the extermination of all animals most valued in the chase."

Marye (1945) has presented an excellent and invaluable account of the extinct wild mammals of tidewater Maryland. He records elk, bear, beaver, panther, bison, and the bobcat, mostly from the southern portion of the Eastern Shore. His interesting account is probably the best accumulation on Maryland's extinct wild mammals to date. McAtee (1918) accumulated a large amount of material to show the former occurrence of extinct wild mammals around the District of Columbia. His book on *A Sketch of the Natural History of the District of Columbia* is a classical contribution in its own right.

There are numerous other smaller accounts of the mammalian fauna of Maryland, but most are not as significant as those mentioned above. References which mention the extirpated species are cited in the following annotated account of extinct or vanishing Maryland mammals. There are probably many other noteworthy references in letters, historical documents, county histories, genealogical accounts, newspapers of small towns, counties, and cities, but a

*The southernmost limit of the caribou apparently reached the Adirondack region of New York at one time Glover M. Allen, 1942. The caribou has been found nowhere near Maryland, and cannot be considered an inhabitant in recent times.

careful perusal of these would consume a lifetime. The following notes substantiate the validity of a species' occurrence to the best of the author's knowledge.

A M E R I C A N B I S O N

Bison bison bison (Linnaeus)

•(Other Names: Eastern Buffalo, Wood Bison, Buffalo, Bufeloe, Buffeloe)

When the first settlers arrived in Maryland, the American bison was already becoming scarce. Today it is completely gone, having been extirpated by man in Western Maryland in 1775.

Hornaday (1889) has left us a rather good record of the discovery of bison in Maryland and the District of Columbia. In the latter area he records, "There is no indisputable evidence that the bison ever inhabited this precise locality, but it is probable that it did. In 1612 Captain Argoll sailed up the 'Pembroke River' to the head of navigation. (Mr. [Joel A.] Allen believes this was the James River, and not the Potomac) and marched inland a few miles, where he discovered buffalo, some of which were killed by his Indian guides. If this river was the Potomac, and most authorities believe it was, the buffaloes seen by Captain Argoll might easily have been in what is now the District of Columbia."

Captain Samuel Argoll, the English Navigator, in 1612, left his own account which is the subject of the Hornaday-Allen controversy: "As soon as I had unladen this corne, I set my men to the felling of Timber, for the building of a Frigat, which I had left half finished at Point Comfort, the 19. of March; and returned myself with the ship into Pembroke River, and so discovered to the head of it, which is about 65. leagues into the Land, and navigable for any ship. And then marching into the Countrie, I found great store of Cattle as big as Kine [oxen], of which the Indians that were my guides killed a couple, which we found to be very good and wholesome meate, and are very easie to be killed, in regard they are heavy, slow, and not so wild as other beasts of the wildernessee." McAtee (1918).

Hornaday presented more evidence regarding bison in the District of Columbia. "Admitting the existence of a reasonable doubt as to the identity of the Pembroke River of Captain Argoll, there is yet another bit of history which fairly establishes the fact that in the early part of the 17th century, buffaloes inhabited the banks of the Potomac between this city [Washington] and the lower falls. In 1624 an English fur-trader named Henry Fleet came hither to trade with the Anacostian Indians, who then inhabited the present site of the city of Washington, and with the tribes of the Upper Potomac. In his journal (discovered a few years since in the Lambeth Library in London) Fleet gave a quaint description of the city's site as it then appeared. The following is from the explorer's journal:

'Monday, the 25th June, we set sail for the town of Tohoga, where we came to an anchor 2 leagues short of the falls [nine miles above the present site of Washington, D. C.]. This place, without question, is the most pleasant and healthful place in all this

country, and most convenient for habitation, the air temperate in summer and not violent in winter. It aboundeth with all manner of fish. The Indians in one night commonly will catch 30 sturgeons in a place where the river is not above 12 fathoms broad, and as for deer, buffaloes, turkeys, the woods do swarm with them... The 27th of June I manned my shallop and went up with the flood, the tide rising about 4 feet at this place. We had not rowed above 3 miles but we might hear the falls to roar about 6 miles distance.*

*Charles Burr Todd. Story of Washington. P. 18, N. Y. 1889."

Hornaday further comments on the above account, "It is to be regretted that the narrative of the explorer affords no clew to the precise locality of this interesting discovery, but since it is doubtful that the mariner journeyed very far on foot from the head of navigation of the Potomac, it seems highly probable that the first American bison seen by Europeans, other than the Spaniards, was found within 15 miles, or even less, of the Capital of the United States, and possibly within the District of Columbia itself."

The discovery of skeletal remains of a bison in Bushey's Cavern, near Cavetown, Washington County, recorded by Garretson (1938), represents almost a prehistoric occurrence. The bison remains were found among fossilized remains of Pleistocene and fragments of other recent mammals which have not been exterminated.

The anonymous contributor to *A Relation of Maryland* asserted that in 1635 the "Bufeloes" were to be found in the "upper parts of the Country." Alsop (1666), author of *A Character of the Province of Maryland* stated that "Furrs and skins" of "Buffeloe" were "first made vendible by the Indians of the Country."

With reference to the paleontological evidence of bison in Maryland, two of the most distinguished zoologists in America during the latter part of the 19th century - Joel A. Allen, of Harvard University, and Edward Drinker Cope, of the Academy of Natural Sciences of Philadelphia, crossed swords over this subject. Joel A. Allen (1876) stated, "Professor E. D. Cope, however, recently says: 'Of the Ruminants [of Maryland], the bison (*Bos Americanus*) and the elk (*Cervus Canadensis*), the largest known of the true deer, have been destroyed by human agency,' implying their former existence in that State. On inquiry of Professor Cope for the grounds for such an inference he states that he has found their unfossilized bones in superficial deposits in Virginia and adds: 'I think, but, will not now assert, from more northern localities.'" [Allen's Footnote], "In this connection I may add that I have examined remains from the banks of the Susquehanna, and other localities in Maryland, some partly fossilized and others unchanged, which though collected for bison remains proved to be those of domestic cattle."

Strangely enough, Meshach Browning (1928) does not record the occurrence of bison, and did not mention seeing skeletal remains in Garrett County. Why he did not acknowledge their occurrence is a mystery for they were apparently exterminated about 1775, ten or fifteen years before his arrival to this westernmost county of Maryland. Rhoads (1903), for example, had written

that "There is a noted Elk Lick here [Castleman's River in Pennsylvania, part of which is in Maryland] near the Maryland Boundary to which the buffaloes undoubtedly resorted ..." This locality was not far from Browning's residence.

The most authentic account of bison in Maryland has been published recently by the *Glades Star* (1943), publication of the Garrett County Historical Society, in an article entitled, "The Last Buffaloes." "Before the white man settled in the Glades [meadowlike areas in the mountains of Western Maryland] large herds of Buffaloes came up from the lowlands to graze on the rich glade grass in summer, but reckless slaughter of the animals soon destroyed this source of sport and food. The Ashbys tell the story of a day in early winter [circa 1774] when one of the Ashbys and a neighbor were searching for the neighbor's cows. They followed the tracks of some animals in the light snow until they came to what is now the J. J. Ashby farm, when Ashby saw a bunch of wooly hair on a snag.

"Have your cows grown wool?" he asked.

"They have been gone so long, damned if I know what they have grown," replied his companion.

"Following the trail to the hill southeast of the present town of Crellin, four buffalo were found. They shot the bulls and the cows escaped westward. These were the last buffaloes seen in the Glades.

"It appears that buffaloes and Indians were numerous here during the early years of the Ashby settlement. Sarah Ashby used to relate stories of Indians spying on the Fort at night; the few inmates would throw buffalo tallow on the fires, making a great blaze, as if a large company was within. The Indians never attacked the fort." William Wilton Ashby and his wife, Sarah Williams, were the first permanent settlers of the Great Glades of Garrett County.

Hoye (1942) related that in 1765 John Friend, Sr. found "Fish and game were abundant [in Garrett County] including herds of deer and buffaloes and flocks of wild turkeys..." John Friend, Sr. was considered the "venatic oracle of the whole countryside, who in childhood had actually seen a wild buffalo on the Maryland soil, and in manhood had slain elk, bear, panther in these very glades..."

In Garrett County, Buffalo Run was so named because one of the early settlers killed a buffalo on the north bank near its mouth. The village was patented in the Land Office Records as "Buffellow Run, 149 acres in 1773," according to the *Glades Star* (1943).

Early pioneers in Maryland have left a series of place names which recall the occurrence of bison in widely separated localities in our State:

Dorchester County: Buffalo Creek.

Carroll and Frederick Counties: Buffalo Road.

Garrett County: Buffalo Run (village); Buffalo Run; Little Buffalo Run; Buffalo Marsh.

The distribution of the bison in Maryland must have been above the Fall Line in Maryland and the District of Columbia. The bison inhabited the hilly, rolling areas of the Piedmont and upland zones. Hornaday (1889) has shown such a general distribution on his map, which is part of his large map of the bison's North American distribution. If the place name, Buffalo Creek, in Dorchester County, has any validity, the bison's distribution on the Coastal Plain must be considerably modified. Marye (1945) does not definitely cite any records which would substantiate the bison's occurrence on the Coastal Plain, except to say, "Captain Henry Fleete, the Indian trader saw buffalo on the Potomac near the first falls of that river in 1632, and place-names indicate that this animal may have frequented the vast barrens, which stretched across the northern part of Baltimore and Harford Counties." References to the above-mentioned place names have not been found by the present writer, and it seems that the bison probably ranged above the Fall Line.

Hornaday (1889) records some interesting facts regarding the bison in Virginia. He alludes to "...references to the discovery of buffaloes on the eastern side of Virginia mountains, quoted by Mr. Allen from Salmon's 'Present State of Virginia,' p. 14 (London, 1737), and the capture *and domestication* of buffaloes in 1701 by the Huguenot settlers at Manikantown, which was situated on the James River, about 14 miles above Richmond. Apparently, buffaloes were more numerous in Virginia than in any other of the Atlantic States."

Shoemaker (1915b) relates an interesting account of bison in Pennsylvania. He named the subspecies, *Bison americanus Pennsylvanicus*, stating that those individuals inhabiting the area east of the Alleghenies were larger, blacker, and possessed a somewhat flatter hump. No specimens exist for comparison with the bison found west of the Alleghenies. Therefore, according to Schorger (1944), the subspecies *Pennsylvanicus* is invalidated since it was based on legend and subjective accounts. Hence, *Bison bison bison* (Linnaeus) is retained as the correct technical name. Shoemaker stated his case as follows: The Pennsylvania bison "... deserves to be called the *Bison americanus Pennsylvanicus*. Doubtless west of the Alleghenies the individuals shaded into the true bison of the plains, but those which ranged between the east and west slopes of the Alleghenies, migrating between the Great Lakes and the Valleys of Southern Pennsylvania, Maryland and Virginia, to Georgia represented the type of bison of the Keystone State."

Shoemaker has documented the occurrence of the bison in Pennsylvania with a great deal of historical evidence in the form of accounts from old hunters, material in historical accounts, etc. With such a preponderance of data, he has been able to present a theory regarding the migrations of bison, which indirectly included Maryland. He states, for example, "Doubtless at one time, probably as late as 1770, the streams of bison from New York and the Ohio Country united in the Southern Pennsylvania Valleys and swarmed in a solid phalanx into the warmer regions of the Carolinas and Tennessee, each winter. Settlements in Southern Pennsylvania checked the migrations, and no bison moved farther south than Middle Creek Valley after that... Their extinction therefore was en-masse [in Pennsylvania], and not gradual like the later extermination of the elk."

W A P I T I o r A M E R I C A N E L K

Cervus canadensis canadensis (Erxleben)

(Other Names: Eastern Elk, American Stag, Elk, American Red Deer, American Wapiti, Elke, Red Deer, Gray Moose, "Caribou" (?), Moose-deer.

Despite the fact that the Wapiti occurred throughout the State of Maryland, only a few definite records remain. It has been completely extirpated, and no attempt has been made to reintroduce it into the State, as has been done recently in Virginia.

As early as 1635, an anonymous contributor to *A Relation of Maryland*, stated that "Elkes" were to be found in the "upper parts of the country." Alsop (1666) also reported that Maryland afforded a "Trafique" for the skins of "Elke." Strangely enough, Browning (1928) during his hunting escapades in Garrett County between 1791 and 1836, does not differentiate between deer and wapiti, which undoubtedly occurred sparingly during the latter part of the 18th century.

Christopher Gist, on November 8, 1751, camped at Little Meadows, Garrett County, and stated "We hunted all the ground for 10 miles or more and killed several Der & bears and one large Elk - The bottoms upon the branches are but narrow with some Indian Fields."

Cope (1873) remarked that "... the elk (*Cervus Canadensis*) the largest known of true deer, [has] been destroyed by human agency." Scharf (1882) stated, on the authority of Uhler, that the elk had been exterminated in the State. Marye (1945) in speaking of the occurrence of the wapiti in Tidewater Maryland, states that "Elk skins were a feature of the inventories of estates of our colonial planters, and such place-names as Elk River, Elk Ridge and Elk Neck, bear witness to the former presence of that animal in Maryland."

Andrew Burnaby (1775), in describing the voyage up the Potomac River, visited Mount Vernon in October, 1759, according to McAtee (1918), and described Virginia in general. His account of the fauna which he observed may have been based on recollections of his Maryland travels. He described wapiti or "moose-deer" and buffaloes from these areas.

McAtee (1918) has remarked that the wapiti existed in the District of Columbia but were extirpated about 1844, since this date represents the date of extirpation of this species in Virginia. Handley and Patton (1947), however, place the date of the killing of the last wapiti as 1855 in Clarke County, Virginia, which is immediately adjacent to West Virginia, twenty miles or so south of Washington County, Maryland. Wapiti have been re-established successfully in Virginia, but their numbers are small. Handley and Patton (1947) declare that civilization slowly encroaching on the already restricted range, will cut short the future of the wapiti as a game animal in the four counties of southwestern Virginia.

Stearns (1940) has found remains of wapiti in the refuse pits of Indians, who inhabited an aboriginal village site on the Potomac River in

Montgomery County. Gidley and Gazin (1938) record skeletal remains of "*Cervus* species" which may have been a recent wapiti. Cope (1871) recorded the remains of wapiti from Pleistocene deposits at Oxford Neck, Talbot County. No doubt a large number of other significant records exist, but the writer has not been able to trace them down.

Maryland has a number of place names which celebrate the occurrence of the American elk in Maryland. The following have been taken from the Manual of Coordinates (1947):

Anne Arundel County: Elklick Run.

Garrett County: Elklick Run (2 localities).

Cecil County: Elk Mills (town); Elk Neck; Elk Neck (town); Elk Neck State Forest; Elk Neck State Park; Elk River; Elkton; Elkton Land-
ing; Elkton PRR (bridge); Elkton Reservoir.

Washington County: Elk Mountain; Elkridge

Harford County: Elkridge (Harford Hunt Club).

Howard County: Elkridge; Elkridge Manor.

Baltimore County: Elkridge Country Club; Elkridge Fox Hunting Club.

These place names intrigued Rhoads (1903), who investigated assiduously their origin in northeastern Maryland. "... Elk River in Maryland ... whose origin I have not satisfactorily traced ... indicates the former presence of this animal nearer the Atlantic seaboard than anywhere else in the United States."

He continues, "The following paragraph was written by a life-long resident of Colora, Cecil Co., Maryland, in answer to my inquiries regarding the origin of the place names of Elk River, Elk Creek, and Elkton in Md., with their repetition in ... Pa., ...

'After living here 60 years I have never heard of the elk-deer being found in these regions. I have always had the idea that our creek obtained the prefix from the circumstances of coming together in a common estuary as the horns of an elk to his skull. The creeks being thus named, the tidewater part, the bay, was called Elk River. Hence also the name of the town and railroad station.' - Lloyd Balderston, 4-10-1901.

I have recently made personal inquiry among the old residents of this region, and while there is no absolute proof of the former existence of elk there *now* known to them, it is the general opinion that such was the case. Certain old salt and sulphur springs are mentioned as forming a likely attraction.- Rhoads, 1902." Rhoads also mentioned a noted Elk Lick near the Maryland boundary across the line from Garrett County.

Shoemaker (1915b), regarding the American Elk in Pennsylvania, has written, "Elks traveled in herds, migrated between the Northern Mountains and Southern Valleys in Pennsylvania, were no more fleet of foot or shy than buffaloes. One by one the elks were shot out until the last met its end in the Black Gap, on October 1, 1878." With the absence of any objective records it can only be assumed that the wapiti in Maryland suffered the same fate as their Keystone State brethren.

VIRGINIA WHITE-TAILED DEER

Odocoileus virginianus virginianus (Boddaert)

Today the Virginia white-tailed deer is a common sight in the wilder portions in most of the State. At one time, however, it was so scarce that it was generally thought to be exterminated. In fact, the *Maryland Conservationist* (1948, Vol. XXV, No. 1) stated unequivocally that less than 50 years ago the Virginia white-tailed deer had been extirpated. "Prior to the State-wide deer law, the last deer in Maryland was killed in Allegany County about 1902 by deer dogs. From that time until 1927, few deer, with the exception of those on special reserves, were seen in the Old Line State."

Meshach Browning (1928) reported during his last years of active hunting in 1839 that the herding of foreign cattle in unbounded pasture areas in the Glades of Allegany and Garrett Counties forced deer to become very scarce. Deer were chased into deep snows, where they were ruthlessly slaughtered. Despite Browning's apparent concern for Maryland deer, he was definitely uninhibited about killing every individual that crossed his path. His account of hunting experiences is replete with his exploits regarding how he killed the estimated number of 1800 to 2000 deer during his lifetime (1771-1859).

At one time deer were indigenous to every county in the State, because a greater part of Maryland was forested. Captain John Smith (1607-8), Henry Fleet (1632), Alsop (1666), Baillie (1820), Ducatel (1837), Cope (1873), Scharf (1882) mention unanimously that deer were abundant in Maryland and the District of Columbia. Marye (1945) remarked that, "Deer, of course, abounded throughout Tidewater and were exterminated and later reintroduced in certain counties, notably Cecil and Worcester." This resource proved no doubt to be an excellent source of food for the early settlers. There are countless other references about the abundance of deer in letters and accounts of conditions about the 17th, 18th and 19th centuries. Barden (1820) specifically mentioned that deer probably occurred on Analostan Island, near Washington, D. C., in the Potomac River, until about 1770.

Denmead (1941) states that the first deer park established in the United States was in Maryland. It was originated by a Bohemian, Augustine Hermann, in 1661, in Cecil County. At that time, of course, deer were not protected, and it seems reasonable that Hermann was concerned over the unrestricted killing of deer by early settlers. The steady decrease of deer from that period until the 20th century disturbed Maryland conservation authorities. The *Maryland Conservationist* (1948) asserted that "A state-wide law closed deer shooting in all counties in the 20's, and was opened in three counties in 1927. In less than fifteen years, the Maryland deer herd has been built up from a few to more than ten thousand." The concern for the propagation of deer was so great that the *Maryland Conservationist* (1928) stated that Negro Mountain deer attracted large numbers of bobcats or 'wildcats.' Wild-cats do not hesitate to attack even the largest of deer by springing upon their backs from branches of trees..." Although bobcats may attack an occasional deer and steal lambs from mountain flocks, they cannot be accused of making even an appreciable dent in the deer population.

In 1932 the *Maryland Conservationist* reported that deer were increasing in Maryland. Deer were observed on the beach between the Atlantic Ocean and Sinepuxent Bay, south of Ocean City. Twelve specimens were released in the swampy area of Worcester County, near Queponco. In 1935 the *Maryland Conservationist* stated that Dr. Charles R. Law, of Berlin, Worcester County, had released in 1930 a number of Japanese sika deer, *Cervus nippon* (probable species). It was estimated that about 100 to 125 Virginia white-tailed deer were roaming the wilds of Worcester County.

Minke (1946) recalled that in 1903, and for many years after, no deer were to be seen near Cumberland. This was strange since this region had always been a haven for many deer. Deer decreased in number for many reasons. The *Maryland Conservationist* (1937) reprinted a story of how a wild dog pack killed a young buck. Previously it was reported that twenty-five deer were slain during January, 1936, in Frederick County. Before that period, twenty-three were killed. Dogs have always been a hazard to fawns and deer caught in snowdrifts. Fires have laid waste to large areas of forested lands in Maryland, and, of course, have caught almost all of the wildlife in their wake. Photographs of mangled and charred deer continue to horrify the true conservationist in Maryland.

In Maryland, wise conservation and an intelligent restocking program have made the Virginia white-tailed deer's reintroduction a success, so much so that Maryland may soon follow the lead of Pennsylvania in urging that hunters kill does as well as bucks in the interest of a balanced, well-managed deer resource. Handley and Patton (1947) have pointed out that the little spotted fawns are born in late spring. Well-meaning citizens, who believe them to be foundlings, take them home, ignoring the well-known fact that the mother is usually nearby. It is cruel to separate the little animal from its mother, despite the fact that fawns are easily raised on a bottle. When they attain the adult size they must be returned to the woods where they adjust themselves to the new environment with difficulty. Hand-raised deer seldom become wild, and tame bucks are dangerous during the mating season. The chances of survival for tame deer returned to the forest are small.

In certain areas deer have become a nuisance to farmers who complain about their ravages on gardens and fields, and it is said that they can easily leap over a seven-foot fence. Deer occasionally wander into small towns or cross heavily-traveled highways, and are often killed for this folly. In a number of other ways this large mammal has difficulty adjusting itself to ever-expanding civilization. They are gradually being restricted to such a limited range of freedom that their future as abundant big game does not appear to be rosy.

EASTERN BLACK BEAR

Ursus americanus americanus (Pallas)

Bears were always the bane of the existence of early settlers in Maryland, but they still exist today in restricted portions of Western Maryland. The Eastern black bear was once distributed throughout the entire State,

especially when the country was heavily forested. During the past two or three decades it has been on the verge of extinction, and its numerical status has vacillated with the decrease of deer.

Smith (1607-8) reported meeting Indians in canoes laden with the flesh of "Beares," in the vicinity of the District of Columbia. Fleet (1632) also recorded them from near the present site of Washington, D. C., while McAtee (1918) amplifies their comments, "Thus bears were recorded along the Potomac both above and below the present site of Washington, and there is no doubt that they once roamed over all the territory now included in the District."

An anonymous contributor to *A Relation of Maryland* records bears in 1635 from the "upper parts of the Country." Alsop (1666), writing in *A Character of the Province of Maryland*, did not record them, however, but Marye (1945), remarking upon the extinct wild mammals of Tidewater Maryland, makes the following interesting comments, "In the eighteenth century, bounties on bears' heads were paid in Somerset County, where bears were especially common. In Baltimore County, on Gwinn's [sic] Falls, there were the Bears' Wallowing Ponds. An old deposition tells of bear-hunting on the upper Patuxent. There is one known record of the killing of a bear in Tidewater Maryland. A land commission was held in 1733 to determine the bounds of a tract of land on the eastern side of Bush River near its mouth. One of those who testified before this commission deposed that about thirty years theretofore, he saw a bear shot on the aforesaid land from a bounded tree standing by the river side. Captain John Smith, in 1612, saw bears in numbers on the shores of the Chesapeake in what is now Calvert County."

Ducatel (1837), Cope (1873) and Scharf (1882) list the bear as an indigenous form in Western Maryland. Hay (1920) recorded the bones of a bear from Bushey Cavern, near Cavetown, Washington County. Truitt (1946) has summarized some interesting facts concerning Maryland bears, "Two centuries ago, bears were so plentiful in the State and so destructive to domestic animals and to crops that a bounty was put on them to reduce their numbers. Coastal Worcester County, for instance, by an Act in 1744, was permitted to pay a reward of 100 pounds of tobacco for every bear killed. The procedure was simple. Kill the bear by arrow, snare or flint lock, remove the head, deliver it to a Justice of the Peace for certification and then payment by the Treasurer." Truitt continues, "Typical of bounty payments for predators, such as the one recently discontinued on hawks in certain counties, bear heads on occasions were returned for certification, two, three or even more times until suspicion was aroused. This lead to a provision in the bounty law that required the Justice of the Peace to remove the ears and tongue from those heads for which bounty was paid."

Meshach Browning (1928) has left us with the most vivid accounts of the habits of bears in Garrett County during the early 19th century, although he did not embellish his accounts of habits of big game with pure fiction as he did the habits of the timber rattlesnake, *Crotalus horridus horridus* (Linnaeus). Browning is famous mostly as a bear-hunter, and it is reported that he had slaughtered from 300 to 400 bears at Little Crossing, but some of the stories of his physical prowess as a hunter of Eastern black bears require extraordinarily gullible readers. He reported that many bears were

still evident in Garrett County as late as 1839. One bear which he captured in a trap weighed 319 pounds.

Bears are ruthless killers of sheep in mountain districts of Maryland; but they become mutton-eaters because of the paucity of their normal staple items of diet of insects, berries, small mammals, corn and honey. The only method of coping with renegade bears is to track each such individual with hounds, and kill it immediately upon hunting it down. The majority of bears are not sheep-killers, and should not be treated as such. When left unmolested they go their own way. Adult bears are formidable antagonists, and mother bears with cubs, according to Handley and Patton (1947), should not be disturbed under any circumstances, for they can easily outrun, outclimb, or outfight any unarmed human.

Glover M. Allen (1942) asserts that the Fish and Wildlife Service estimated that after a nationwide bear census, approximately 150 individuals were reported to be living in Maryland. Pennsylvania possessed 3,300 individuals, while Virginia and West Virginia contained 600 and 2,100, respectively, the majority of specimens having been spotted in mountain districts.

Truitt (1947) has aptly expressed a generous attitude to our dwindling bear population. When three bears were slain by deer-hunters, he declared the following, "And in what contrast to conditions of a short two centuries ago when practically throughout the Palatinate there was a liberal bounty on old Bruin! Along the Coast, up the Shore, over the Potomac, west to Allegany and up in Garrett it was, alike - 'kill the bear!' Extermination followed. The three bears killed were probably derived from stock that wandered from one or the other of the states in that region since they, Pennsylvania and West Virginia, have continued their bear populations much to the delight of sportsmen. Since one of the three killed was a cub, it would appear that the bear has - or had - re-established itself in Maryland. The forthcoming Session of the Legislature may be asked to take cognizance of this restoration of an original inhabitant and to provide for the protection of his kind."

As Western Maryland becomes more densely populated, and as the extensive forests are laid waste, this spectacular beast will disappear mainly because it is unwanted. At most it will remain in only the more inaccessible portions of Maryland wildlife sanctuaries.

E A S T E R N C O U G A R

Felis concolor cougar (Kerr)

(Other Names: Cougar, Panther, Mountain Lion, Catamount, Adirondack Cougar, Puma, Painter, Lion, Lione, American Lion.)

The Eastern cougar in Maryland was hunted down with relentless energy by the early settlers. At one time it occurred over the whole State, its distribution probably being governed by the range of the Virginia white-tailed deer, which served as a staple item of diet. Before the beginning of

the 19th century it was completely exterminated from most of the State except for the westernmost mountainous section. Presumably it has been completely extirpated, and the absence of skins, skulls and other skeletal remains substantiate this premise. On the other hand, almost every few years, "panthers" are reported as turning up on some mountain. It can be said almost without equivocation that reports of cougars are based on bobcats, (often called "catamounts"), or a fleeting glimpse of a fox.

The first mention of the cougar from Maryland was made by an anonymous writer of *A Relation of Maryland* in which he stated that "Lions" were to be found in 1635 in the "upper parts of the Country." Burnaby (1798) and McAtee (1918) allude to the occurrence of the cougar in the District of Columbia. Ducatel (1837), Cope (1873), and Scharf (1882) state that the panther occurred in Maryland, during their contemporary period but was restricted to the mountain regions.

Meshach Browning (1928) during his active period as a hunter between 1790 and 1836 reported a great many encounters with the cougar at Little Crossing, and surrounding parts, in Garrett County. To Browning's credit he did not accuse the much maligned cougar of attacking him; in fact, most of his encounters were with rather lethargic beasts, at least until he killed them with one shot with his flintlock. It is estimated that he killed about fifty cougars. This figure is large, but still credible, considering the secretive and wary nature of these large felines.

Young and Goldman (1946) have summarized the pertinent material on the cougar in Maryland by presenting important excerpts from Meshach Browning's book:

"Meshach Browning (1928), a noted early-day trapper in Maryland, gives a number of records of the puma's occurrence in Garrett County, north-western Maryland, between 1791 and 1830, as follows:

Buffalo Gap, Deep Creek. The Country abounds in panthers. (1791, P.20).

Blooming Rose. Directly within ten steps of me up rose the head and shoulders of the largest panther that I ever saw. He measured eleven feet, three inches, from the end of his nose to the tip of his tail. (1797, P. 78).

Bear Creek Glades (near head of Bear Creek). Gunner presently came to a great crack in the rocks... To my astonishment a panther bounded out... September (1803, P. 123).

Big Gap of Meadow Mountain. Instead of a wolf we found a panther upon a tree. January (1819. P. 208).

Negro or Meadow Mountain. I took care to keep at a safe distance, and taking good aim, I sent a ball whizzing through his brains, which put an end to a wild and furious monster. (1820, P. 213).

Meadow Mountain, southern end, east slope, near Savage River. I had killed three out of four of the family. (1830, P. 275).

Meadow Mountain, southern end, one taken. He measured nine feet, ten inches from the end of his nose to the tip of his tail. (1830, P. 282.)."

Young and Goldman (1946) further state that "In Maryland this animal was commonly referred to as the panther. Scott (1807, p. 28) mentioned it as occurring in the State, but at what points cannot be ascertained from his reference. Audubon and Bachmann (1851: 312) include it among the mammals of Maryland." Philp (1861, P. 22) lists it as one of the mammals which formerly roamed "over its surface."

True (1892) discusses the distribution of the cougar in Maryland as follows: "The species formerly occurred here, according to Audubon and Bachmann (see Quadrupeds of North America, II, 1851, P. 312). It is included by Scott among the indigenous animals of the State under the name of panther..." The only specimen remains of the cougar in Maryland have been recorded by Hay (1928) from Bushey Cavern, Cavetown, Washington County. These bones were found with many fossilized Pleistocene vertebrates and some skeletal remains of recent mammals. Panther Branch in Baltimore County, is the only place name in Maryland devoted to memory of the Eastern cougar.

Marye (1945) stated that among the extinct wild animals of Tidewater Maryland, the panther or Eastern cougar (in colonial times known generally as "lion,") was to be found. "Names of early land-grants bear witness to the former presence of panthers in Tidewater Maryland. Among the records of the Parker family of the Eastern Shore of Virginia there is mention of the killing of a panther in those parts. A similar record exists for Maryland. In his will, dated October 30, 1675, William Crouch, of Anne Arundel County, bequeathed to his daughter, Sarah Jones, 'Crouches Calve Pasture' on Severn River, 'but not to follow the line to the southward over the branch where James Smith and John Howard kill'd the Lyon.'" "

Shoemaker (1914), in discussing the cougar in Pennsylvania, asserted that "In Nov. 1913, several farmers heard panther cries, and one reliable person saw a panther in his barnyard in Logan Valley near Altoona. Johnstown papers reported a panther as doing much damage to deer and other game at Laurel Ridge in Somerset County, in the same month. There is probably a panther path leading into Pennsylvania from Maryland and West Virginia Mountains. This was proved by the killing of a panther in November, 1913, several miles north of Washington, D. C. This wanderer evidently heard or scented the mountain lions at the Rocky [sic] Creek Park zoo, lost his bearings, became over confident and paid the death penalty."

Glover M. Allen (1942) also quoted Shoemaker's account of the cougar reported north of Washington, D. C. Shoemaker's assumption that these felines would travel over the "panther path" of the mountains because one individual was killed outside of Washington is somewhat farfetched in view of the gauntlet of urban areas through which the animal must have traveled. If a cougar was killed near the Nation's capital, then the animal probably escaped from one of the numerous carnivals, circuses, and traveling shows which exhibit cougars bought very cheaply from Florida and Texas animal dealers.

The *Baltimore Sun* (January 8, 1949) reported that a cougar was loose in the vicinity of Salisbury, Maryland and residents reported that "the mountain lion or something resembling this carnivore" was roaming Worcester County. Several people were reported to have seen it. In one instance tracks left by the animal measured about four inches across. Samuel Shockley, 21, of near Snow Hill, said he spotted the beast while driving along the Whiton-Powellville highway. He stated that it was about five feet long from nose to tail, about thirty inches high, and had a tawny body with a long tail. Luther Atkinson, of Snow Hill, said a lion jumped in front of his car, near Cedartown, and then bounded into the woods. At least nine other individuals claimed to have seen an animal resembling a cougar. The story ended with this observation: "But First Sergeant C. C. Serman, State police commander on the lower Eastern Shore, is taking the reports with a bit of skepticism. He's waiting to see for himself." The specimen also must have been an escapee from a road show, or may be accounted for from the following: Mr. George Jones remarked (*Monthly News Flash, Maryland Game and Inland Fish Commission*, 1949: (19)) that a U. S. Flier had two lions as kittens, and when he was transferred to another station, liberated them in the neighborhood of the Pocomoke River.

Notes on mammals from files of the Maryland Academy of Sciences indicate that two skins of the cougar were received from Dr. J. Lee McComas on March 4, 1876 from Oakland, Maryland. The skins, however, cannot now be found, so that it cannot be ascertained whether the animals were correctly identified, although such an astute zoologist as P. R. Uhler, who was actively concerned with the fauna of Maryland, would not have allowed an incorrect identification of such an animal. The *Baltimore Sun* (January 29, 1897) reported that "Aaron Sims of Pine Grove, Garrett County, caught a catamount* in a trap which broke the chain and dragged it some distance before it was shot." The *Baltimore Sun* (March 3, 1895) also printed an item which said that a trapper on the mountains in the vicinity of Penmar "reports that a catamount or mountain lion still exists and is rather on the increase." The *Baltimore Sun* (March 1, 1919) reported that a large panther had been seen roaming on Big Savage Mountain, Garrett County, north of Mt. Savage. It was seen on a farm; later a dead, partly eaten calf was found, and the panther was suspected. The *Maryland Conservationist* (Vol. V, No. 1, 1928) also stated that "George P. Edgar reports the killing of fourteen lambs on his Cranberry River plantation by what was supposed to be a panther. The throat of each lamb was cut. There were no tracks or other signs. Some of the carcasses were covered up. A panther was seen last summer just across the mountain from where the sheep were killed."

Recently a gentleman was heard to relate that three cougars had been killed in 1948 in Western Maryland. In addition he asserted that a man had been killed, badly mauled in the face by a cougar. There are no facts from a reputable doctor that such an event occurred, nor has any responsible

*A later discussion in this paper will clarify the general fact that the term "catamount" refers to the Eastern bobcat in the parlance of Garrett Countians, rather than to the Eastern cougar.

person reported the occurrence of cougars with definite authority. If the above-mentioned event happened, conservation authorities would certainly have publicized this unusual fact, since most of them are aware that the cougar is extinct in Maryland. No less an authority than Hamilton (1943) has stated that no cougars exist east of the Alleghenies except in Florida.

Recently the *Maryland Conservationist* (1949) reported that a "catamount" had been killed in Allegany County. An inquiry addressed to Mr. Dale Arner, Wildlife Field Superintendent in Western Maryland, disclosed that the animal was the common Eastern bobcat. He stated that this animal is commonly referred to as the "catamount." Although the latter term often refers to cougars in certain areas in the United States, the name "panther" is a more commonly used term in Maryland to identify the cougar. The name had its origin with Maryland's earliest settlers, and has been handed down from generation to generation. It is unfortunate, nevertheless, that the epithet "catamount" is often expressed in the same breath to mean "panther," also because it refers to two different animals.

That the cougar had definitely been extirpated in Maryland is a well-known fact. Cope (1873) implied that they commonly occurred in the mountains of Western Maryland. When the last specimen was killed in Maryland is not known, but it is safe to say that this animal disappeared during the latter part of the 19th century. If legitimate observations of the cougar turn up in the future it may be due to specimens emigrating from West Virginia, or perhaps from Tennessee, where traces of the cougar have been reported by reliable witnesses (Kellogg, 1937, 1939), despite Hamilton's (1943) authoritative allegation.

Despite the seemingly accurate descriptions of cougars observed by hunters and others, the reports must be accepted with great caution. Fleeting glimpses of foxes or other large mammals may cause some people to hastily misidentify such animals. It is not too remote a possibility, however, for a runaway cougar to roam at large in such wild portions of the Eastern Shore as the peripheral marshes of the Chesapeake Bay, or the high ridges of Western Maryland without detection. Experience with people who have been interviewed concerning the observation of a "panther" demonstrates that they are prone to exaggerate or even truthfully relate figments of their imagination. In any event a cougar from any locality in Maryland would be accepted as fact only when the skin or skull has been identified by a responsible zoologist or a competent sportsman.

Game authorities are urged to investigate reports of cougars or panthers in Maryland. In particular, a portion of the pelage and the skull should be shipped to the United States National Museum or any other large scientific institution in the Eastern United States.

CANADIAN LYNX

Lynx canadensis canadensis (Kerr)

At the time of its occurrence in Maryland, the Canadian lynx must have been a rare visitor to the mountains of Western Maryland. The lynx is predominantly a northern animal, and is often associated with the Canadian porcupine,

which was found in scattered localities in Western Maryland. The fact that Maryland possesses a vestige of the Canadian Zone, the conditions of which are characterized by upland swamps and glades having certain characteristic plants; namely, black spruce, *Picea mariana*, Canada yew, *Taxus canadensis* and tamarack *Larix laricina*, may justify the inclusion of this species among the once indigenous mammals of Maryland.

The Maryland Academy of Sciences records in its mammal files, in November 22, 1917, the receipt of a skin and carcass, including skull, of a Canada lynx, which measured 30 inches, and tail 4 inches, from Garrett County. George Jessops gave the carcass to Jos. M. Didusch, of 910 E. Biddle Street, in Baltimore, Maryland. Mr. Didusch is deceased, and no record can be obtained of Mr. Jessops. A large number of Eastern bobcat records are available in the files of the Maryland Academy of Sciences, so that it does not seem logical that this particular specimen could have been misidentified, although the measurements listed above may be applicable to the Eastern bobcat.

Rhoads (1903) declared that "In the higher Alleghanies it once reached the southern border of Pennsylvania." Actually his record was from New Lexington, Somerset County, at an altitude of 1837 feet, which is approximately 20 miles from the Maryland border of Garrett County. In addition Cope (1873) stated that the Canadian lynx was "not uncommon" in the mountains of Western Maryland, but his statement was probably not based on Maryland specimens but on speculation, since no specimens from Maryland of this species occur in any American museum.

The Canadian lynx is often mistaken for the Eastern bobcat, but it is readily distinguished from the latter by the long tufts of hair rising from the tips of the ears and by the huge hairy paws. The tail is wholly black at the tip instead of being black above and white below as in the Eastern bobcat. The Canadian lynx is noted for being extremely shy, and is very seldom seen even in areas where it has been known to be abundant. Recently, the lynx was reported from New Germany, Garrett County, but the skin proved to be an Eastern bobcat, *Lynx rufus rufus* (Schreber), which is still to be found in the more rugged portions of Maryland.

Any records of this species from Maryland must be accepted with great reluctance. In particular, the skin and skull must be studied by a trained mammalogist. This species is completely extirpated in Maryland, but there is a tendency among certain outdoorsmen to tag more dangerous-sounding appellations to our common less spectacular species.

E A S T E R N B O B C A T

Lynx rufus rufus (Schreber)

(Other names: Catamount, Bay Lynx, Lynx, Bobcat, Wildcat, Red Cat.)

The Eastern bobcat is still to be found in certain parts of Maryland, and is common in the western portions, while turning up very sporadically in the eastern and southern parts. In general it is being ruthlessly exterminated as an undesirable element of the native fauna, and is much scarcer today than in the past.

Meshach Browning (1928) is reported to have killed scores of bobcats, and perhaps, among them, he may have destroyed some Canadian lynx. From his accounts of the period between about 1790 and 1830, bobcats were almost an everyday occurrence in Garrett County.

Cope (1873) states that it was not uncommon in the mountains of Western Maryland. Scharf (1882), on the authority of Uhler, reports it to be native to Western Maryland. There are many other written accounts of "wildcats" in Maryland, indicating that the animal was once abundant throughout the State. Marye (1945), in writing of the extinct wild animals of Tidewater Maryland, speaks of the "wildcat or bobcat ... [as] perhaps not yet wholly exterminated." He continues, "A generation ago wildcats were destructive of sheep near the Falls of Patapsco River, and in the time of this author were occasionally killed in Baltimore County. About twenty years ago, the writer saw a large wildcat in Day's woods, between the Great and the Little Falls of Gunpowder River. Its screams were heard at night by members of the Day family, and a boy of the same neighborhood saw it in these woods in the company of a domestic tomcat, from which fact it was judged that it was a female." Marye cites the following notes relative to the Eastern bobcat on the Eastern Shore, "Something over two decades ago a wild animal of the cat family was treed by coon dogs on the borders of Nassawango Swamp, near Nassawango Bridge, in Worcester County. It was shaken out of a tree and attacked by the dogs, but fought them off and escaped. This story came from the owner of the land who witnessed this event. His account, which was obtained from him on two occasions, was clear, and there appears to be no reason to doubt it since it is doubtful that a domestic cat, however wild and fierce, could have escaped with his life under these circumstances."

The *Maryland Conservationist* and newspapers, particularly the *Baltimore Sun*, have faithfully reported the occurrence of bobcats during the last few years. The former publication (Vol. V, No. 1) reported that "Wildcats do not hesitate to attack even largest of deer by springing upon their backs from the branches of trees..." It is easy to understand how the bobcat is easily confused with the cougar when one reads the following item (*Baltimore Sun*, November 21, 1912), "Sanford Rice, Nicholas Mt., [Allegany County]", reports that a fight between a catamount and a bull took place in his barnyard. Was witnessed by himself and several farm hands. On Monday night, the 21st ... the carcass was brought to Cumberland, and presented to Herman D. Bellmeyer, a lumber operator. It weighed $29\frac{1}{2}$ pounds and measured $50\frac{1}{2}$ inches..."

Recently (February 18, 1948), the *Baltimore Evening Sun* published a photograph of a large bobcat which had been killed. Entitled "Bobcats still here," the article continued with, "Though considered rare specimens in Western Maryland hills, proof that the bobcats are still around was furnished by Thomas Leary, hunter of Beans Cove, Allegany County, who trapped this game killer on Evitts Mountain." How the numbers of bobcats have decreased in recent years is exemplified in these figures. The *Baltimore Sun* (April 26, 1897) stated that Garrett County hunters captured 29 "wildcats" in 1896, and earned \$58.00 for their scalps.

Despite the abundance of bobcats in Maryland, very few specimens occur

-in mammal collections in Museums for comparative purposes. The United States National Museum possesses a specimen from Oxon Hill, Prince Georges County, captured by W. Perrygo. Bailey (1923) stated, "A. H. Hardisty tells me that two bobcats were caught near the Patuxent River near Upper Marlboro in the winter of 1918-19, and another was seen near there in September, 1919. This brings their present range barely within the twenty mile radius, but it is not improbable that they come nearer to the Capitol. They were recently and probably are still common in the Dismal Swamp and along the Alleghany Mountains in Virginia, and they have been reported from the Blue Ridge Country still nearer. In 1775 they were reported here by Andrew Burnaby."

A few years ago, Mr. John Hamlet, formerly of the Fish and Wildlife Service, declared that a bobcat was known to be roaming the Cypress swamp region along Battle Creek, in Calvert County. Mr. Robert Lambert, junior assistant in the department of mammals, Natural History Society of Maryland, informed the author that a farmer near Rising Sun, Harford County, raised bobcats. which he liberated during the summer of 1949.

A large number of feral domestic cats, *Felis domestica* (Gmelin), are identified as "wildcats," but they are much smaller and quite different in obvious bodily proportions so that it is difficult to confuse a feral cat with a bobcat. The bobcat is undoubtedly vanishing, but its wary and secretive habits are such as to insure its permanence in some of the more desolate portions of the Maryland countryside.

E A S T E R N M A R T E N .

Martes americana americana (Turton)

The Eastern marten has been completely extirpated in Maryland for at least 70 years owing to heavy trapping, coupled with the destruction of suitable forest habitats. Its distribution probably was not widespread, and it was never abundant.

Captain John Smith (1607-8) recorded "Martins" from the District of Columbia, while Father Andrew White (1632) recorded the fact that "... martens [were] not however, destructive, as with us, to eggs and hens." Where the exact site of Father White's references is located is not known, but it may have been in St. Marys County. As late as 1882, Scharf, on the authority of Uhler, commented that the marten was a native mammal to Western Maryland.

McAtee (1918) has written, "The pine marten is not usually recognized as a member of the District fauna, but according to Wm. Palmer, there is a fairly certain record as late as about 1880; Smith's statement therefore probably is correct."

This arboreal species seemed to prefer the deciduous, hardwood timber in Pennsylvania, according to Rhoads (1903). "For this reason, more than any other perhaps, has it become so nearly exterminated in the mountains of northern Pennsylvania where it once abounded. ... Owing to the prevalence of forest fires in Pa., their habits peculiarly placed them at a disadvantage in the struggle for existence as compared with more terrestrial species having their homes under ground."

F I S H E R

Martes pennanti pennanti (Erxleben)

(Other Names: Pekan, Blackcat, Black Fox, Fisher-fox, Pennant's Marten.)

This handsome, furbearing denizen of thick spruce forests probably retreated from Garrett County or other portions of Western Maryland more than two centuries ago, although no definite records exist in literature or in museum collections to substantiate its occurrence here. The only justification for the inclusion of the fisher among the former mammals of Maryland is its former distribution in neighboring states.

Handley and Patton (1947) state that "Before the advance of civilization and the resulting decimation of our spruce forests, fishers were probably common in many parts of Western Virginia; of course, they are now extinct." Rhoads (1903) recorded them from Pennsylvania near Lancaster about 35 miles from the Maryland border. Poole (1932) also wrote that tracks of a fisher were observed in a mountain bog above Strausstown, Pennsylvania in 1931, and Hamilton (1943) declared that Poole recorded a specimen captured at Holtwood, in Lancaster County, Pennsylvania in 1921.

A closer perusal of old letters, historical accounts of early settlers, trapping and fur records, as well as skeletal material from excavations of Indian Mounds, will probably account for the fisher's discovery in Maryland. Gidley and Gazin (1938) record the bones of ten specimens of *Martes parapennanti* Gidley and Gazin, among the pleistocene vertebrates from Cumberland Cave in Allegany County. This fossil species is closely related to the living fisher, and is intermediate in size between *Martes a. americana* and *M. p. pennanti*.

Handley and Patton (1947) theorize why the marten and the fisher, two swift and deadly predators of rabbits, squirrels and mice were not able to hold their own. In addition to their specialized habitats, these creatures had small, infrequent litters and long gestation periods, the fisher's being almost a year. This circumstance probably caused their downfall; the demand by trappers far exceeded the supply from Nature. Whereas rabbits, squirrels and most other small mammals are very prolific and seem to persist with renewed abundance every year despite heavy depredations, other mammals having longer gestation periods and small litters, the situation which exists among most of the larger mammals, rapidly disappeared before the advance of civilization.

The common wolverine, *Gulo luscus* (Linnaeus), has never inhabited Maryland in recent times, in fact, records of it straying south of boreal localities in Pennsylvania do not exist. Gidley and Gazin (1938) report that an extinct wolverine, *Gulo gidleyi* Hall, is represented from the Cumberland Cave, Allegany County, in the form of several fossil specimens including an unusually well-preserved skeleton. The wolverine skeleton, U. S. N. M. No. 8175, has been mounted and is on exhibition in the hall of fossil vertebrates at the National Museum.

TIMBER WOLF

Canis lupus lycaon (Schreber)

(Other Names: Eastern Timber Wolf; Gray Wolf; Buffalo Wolf; Lobo; Loaker; Big Wolf; Appalachian Gray Wolf.)

The howl of the timber wolf no longer resounds over Maryland hills, but until perhaps a 100 years ago the wolf roamed boldly over much of the Western part of the State. Wolves have been completely killed off; their extinction is recognized so widely that stories of their discovery seldom if ever appear in newspapers or sportsmen's periodicals.

Burnaby (1775) is quoted by McAtee (1918) as stating that wolves occurred near the District of Columbia in Virginia. Warden (1819) in speaking of the fauna of Analostan Island, in the Potomac River near Washington, D. C., remarked that in 1728, "The reward for a wolf's head was two hundred pounds of tobacco." McAtee (1918) acknowledged the fact that wolves have been killed off around Washington, D. C. Settlers encountered wolves almost immediately upon landing in Maryland. Covington (1915) stated that the Norwood party, who were rescued by the Assateague Indians, were told by their benefactors that wolves "greatly abound in that Island [Assateague] ." In the same breath they spoke of Spanish Moss and deer as indigenous to this Worcester County locality. The anonymous writer of *A Relation to Maryland* reported that there was a "great store" of wolves in 1635 in the "upper parts of the Country."

Meshach Browning (1928) is reputed to have killed scores of wolves during his hunting exploits in Western Maryland. He relates how he found the trail of a wolf that traveled on three legs along the Youghiogheny River. Later he found the animal asleep under a rock. After killing it, Browning was paid a premium of \$8.00 by the County authorities for its head. Browning also tells of beating a wolf to death with a club. He found the beast in a hollow tree; later he was paid \$9.00 for it. During 1804 six wolves chased five dogs, after which Browning made a great many deprecating remarks about the dogs. As late as 1839 dens of wolves were to be found in the laurels of Meadow Mountain. The scalps of old wolves at this time were worth \$30.00; young wolves had a price of \$15.00 placed on their skulls.

Marye (1945) in writing about some extinct wild animals of the Tidewater region speaks of the wolf as an extirpated species. He says, "Wolves were caught in wolf-pits, and bounties were paid in tobacco for their heads. Bounties on wolves were still being paid in Baltimore, Harford, and Cecil Counties at the beginning of the past century. According to an old court record, a bounty was once paid in Dorchester County on the heads of five puppy wolves. There are, or used to be, in Tidewater many place-names such as Wolf-Pit this or that, sometimes contracted to Wool-pit. The Glades Star (1946) records the following:

"An Act of 1783, to destroy wolves, provided a bounty for every old wolf's head of £ 6, and for every young wolf's head £ 3 to be paid by the counties. It appears that in Western Maryland so many wolf's heads were presented for the bounty that in 1785 the law was amended to provide only 20 or 40 shillings bounty in Frederick County and in Washington of which Allegany and Garrett were then part."

Shoemaker (1914a) stated "In the South Mountain region of Adams, Franklin and Fulton Counties [Pennsylvania] wolves disappeared concurrently with their passing in other parts of the State. Toward the last when they became scarce it was always said that they had gone to Maryland and West Virginia where game was more plentiful.... In the Southern Counties few native wolves hung on after 1890, but they were constantly reinforced by wanderers from West Virginia and Maryland." Shoemaker's premise that wolves emigrated from Maryland to Pennsylvania after 1890 is purely hypothetical, and is not backed up with any proof. His thesis, however, gives us some index with which to ascertain an approximate date when the last wolves disappeared from the State.

Shoemaker (1914a) continued with an interesting note, "Holmes Wiley, a noted wolf hunter of Garrett County, Maryland, whose expedition often extended into Southern Pennsylvania, made a specialty of entering wolf dens and capturing the pups alive, often encountering and vanquishing the justly infuriated parent wolves."

Rhoads (1903) makes the summary statement that wolves were "apparently exterminated in Pennsylvania within the last 10 or 15 years." Handley and Patton (1947) stated that the last Virginia wolf was killed in Tazewell County, in 1910. Brooks stated, as quoted by Allen (1942), that the last wolf killed in West Virginia was in Randolph County in January, 1900. As late as 1882, Scharf declared that the "gray wolf" was still a member of the fauna of Western Maryland. As late as 1897, a large wolf was trapped near Elkins, West Virginia, about 27 miles south of the Maryland line.

The following place-names in Maryland, from the "*Manual of Coordinates for Places in Maryland*", give some idea of where the early pioneers encountered wolves in the State:

Garrett County: Wolfden Run; Wolf Swamp; Wolf Gap.

Anne Arundel County: Wolf Gap; Wolf Rock.

Caroline County: Wolfpit Branch.

Carroll County: Wolfpit Branch;

Dorchester County: Wolfpit Pond;

Frederick County: Wolfville Crossing; Wolf Rock.

Baltimore County: Wolftrap Branch.

Somerset County: Wolftrap Creek.

Wolves which may be reported from Maryland in current newspapers or by hunters probably refer to wild dogs or perhaps the coyote, *Canis latrans latrans* (Say), which has been recorded from the State by Jackson (1922), who reported it as an escaped pet. Feral wild dogs, *Canis familiaris* Linnaeus, are a menace to some livestock and wild game. The *Maryland Conservationist* reported that 25 deer were slain by a wild dog pack in January, 1936, in Frederick County, and before that period 23 were killed in the same county. Before the coming of white man to Maryland, the Indians possessed mongrel dogs which cannot be classified separately from our domestic dog, according to Rhoads (1903), who discusses this point at great length. Whether descendants of the Indians' pets exist today is not known; perhaps they, too, have been extirpated.

Glover M. Allen (1942) has discussed the relationships of wolves in some detail, "It is often said that the European wolf is the ancestor of the domestic dog, but the evidence for this is merely inferential. Usually wolves of any race may be distinguished from the largest dogs by their proportionally larger teeth, shorter ears, and less elevated forehead due to the smaller development of the frontal sinuses. In dogs the length of the lower first molar or carnassial tooth is usually less (and in medium-sized and smaller breeds much less) than 22 mm., whereas in wolves it is in excess of this measurement. In their general proportions and a certain 'plumpness,' however, the teeth of wolves are exceedingly like those of domestic dogs and differ from the narrower more bladelike teeth of coyotes, which some have thought ancestral to dogs."

The coyote is superficially mistaken for the timber wolf in some areas. This species is rapidly encroaching or emigrating into the Eastern United States, where it has been recorded in Virginia, West Virginia, Pennsylvania, New Jersey, northward to Maine (Hamilton, 1943). No doubt some of them are not invaders of their own free will, but are brought here by tourists as pets, or escapees from carnivals or circuses.

Glover M. Allen (1942) also has made an effort to clear up a misconception regarding the ferocity of wolves during America's early colonization: "If one may believe the mass of published accounts, wolves under the stress of hunger have been known to pursue and kill human beings in Europe and Asia, whereas at least in eastern North America there seem to be few or no authentic cases of such bold actions on the part of wolves here in early days, although there are instances of wolves having followed and frightened many of our early settlers." Meshach Browning (1928) does not relate any cases of being attacked by wolves between 1790 and 1836.

R E D F O X

Vulpes fulva (Desmarest)

The red fox has far from disappeared from the Maryland countryside; on the contrary, it is a familiar animal in many sections of the State. The paradox of the red fox is that it has made its debut on the Maryland scene since the coming of the white man, and has increased greatly even as settlement increased, while many of its less fortunate mammalian brethren faded from the Maryland scene soon after man's arrival.

The first settlers in Maryland, Virginia, Pennsylvania, and some other Eastern States did not encounter the red fox as a native element. The only species known to the earliest arrivals was the Eastern gray fox, *Urocyon cinereoargenteus cinereoargenteus*, (Schreber), a less spectacular species which is still common throughout most of Maryland.

The *Centreville Record* claimed that the first fox-hunting in America took place in Queen Annes County about 1650, according to the *Maryland Conservationist* (Vol. VII, No. 2). At that time the only fox hunted was the Eastern gray fox. A Captain of a tobacco schooner was instructed before 1650 to bring back eight pairs of red foxes, on his next trip to Liverpool. They arrived and were liberated along the Eastern Shore of Maryland. The

way the foxes multiplied was "marvelous," according to the *Centreville Record* but they did not migrate into Virginia until the hard winter of 1679-80.

Rhoads (1903) has remarked, "Owing to the importation of European red foxes into their country in early Colonial times, our East American red fox is probably a mongrel species to that extent, claiming as we do that there was originally a specific difference between the two. ... Kalm states that Bartram, of Philadelphia, told him that the Indians were unanimous in saying the red fox was never in the Country before the Europeans."

Nelson (1918) stated that before the coming of the white man, red foxes originally ranged in America over nearly all the forested region from the northern limit of trees in Alaska and Canada south, east of the Great Plains, to Texas; also down the Rocky Mountains to Middle New Mexico. He continues, "Originally they were apparently absent from the Atlantic and Gulf States from Maryland to Louisiana, but have since been introduced and become common south to Middle Georgia and Alabama."

Hamilton (1943) stated that "Red foxes have been introduced into the southern states for purposes of sport; some of these may prove to be *Vulpes regalis*." Anthony, et al, (1917) and Anthony (1928) quotes Dr. M. G. Ellzey in saying that the American red fox "... as found in the States of Maryland, Virginia, West Virginia, North Carolina, and Tennessee, ... is an animal far superior to the English fox, in speed, endurance, cunning, and resource..." This latter statement seems somewhat questionable since it is generally recognized that the red fox of the Middle Atlantic States is a descendent of the English fox, perhaps interbreeding with the Northern Plains red fox, *Vulpes regalis* Merriam, the species which has been introduced from the northern plains from Dakota to Alberta, east to Manitoba and Minnesota.

H A R B O R S E A L

Phoca vitulina concolor (DeKay)

Seals in Maryland waters can only be considered stragglers, not indigenous species; at the same time their status as a vanishing element in our native fauna is somewhat vague owing to the lack of data. This marine carnivore has not entirely discontinued entering the Chesapeake Bay and landing on Maryland soil. Whenever a harbor seal turns up, a blare of publicity usually accompanies its arrival.

Cope (1873) reported its occurrence in the Chesapeake Bay, but he was preceded by DeKay (1842), who declared that a seal was taken in a seine in Chesapeake Bay near Elkton in August, 1824. The specimen was identified as the harbor seal by Dr. Samuel L. Mitchill, one of America's early ichthyologists.

In 1926, the *Maryland Conservationist* (Vol. III, No. 2) reported that "During the early part of February [1925] , Capt. W. J. Haddaway, deputy commander of the Great Choptank river, advised the Department that fishermen in the neighborhood of Tilghman's reported to him the presence of sea lions [sic] in deep water channel of the Bay. Their surmise was that these animals followed the fish in from the ocean and were very active wherever fish

were to be found. ... There is also a record from the Elk River at the head of the Chesapeake Bay."

In 1930, the *Baltimore News*, according to the *Maryland Conservationist* (Vol. III, No. 4), recorded another seal under the following headline, "Farmhand Catches His Own Sealskin Coat in Bay." In this case the seal was discovered at Worton Point, near Chestertown, Kent County, with its "black" head sticking out of water. The farmhand could not make out what it was until the seal reached shore and flopped out about 30 feet from the water's edge. After the specimen was killed the animal was found to be an 85 pound male. This seal when full grown attains a total length of five feet and will weigh from 80 to 150 pounds.

The *Baltimore Sun* (March 25, 1894) stated that near Annapolis "... a seal has been feeding [for several days] about Thomas Pouch lighthouse. The keepers are trying to capture it alive. It sleeps on the foundation stones selecting its bed with great care. Appears to be four feet long." The *Baltimore Sun* (July 9, 1898) reported that one was killed at Tangier Sound on July 8, 1898. It was said to be almost six and half feet long and very tame. The Maryland Academy of Sciences filed a note in its mammal data which stated that on September 14, 1898 one was sighted on a beach above reach of heavy waves at Ocean City, Worcester County. The seal went out to sea on being approached.

The harbor seal is the only American species known to wander voluntarily into freshwater in pursuit of fish. When it enters the Chesapeake Bay it must be regarded only as a winter and fall migrant from its summer home off the coasts of Northern New England and farther north, where it inhabits rocky reefs and outlying islands of the coasts. It feeds on fish. The flesh and skins of young harbor seals were much prized by Indians. This seal is exceedingly wary and difficult to kill with shot. Joel A. Allen (1884) writing in Goode's *Natural History of Useful Aquatic Animals*, remarked that, "In their raids upon the nets of the fishermen they become sometimes themselves the victims, being in this way frequently taken along our own coast as well as elsewhere. They are, however, at all times unwelcome visitors. DeKay [1842] states that formerly they were taken almost every year in the 'fyke-nets' in the Passaic River, greatly to the disgust of the fishermen, the Seals when captured making an obstinate resistance and doing much injury to the nets. Their accidental capture in this way often affords a record of their presence at localities they are not commonly supposed to frequent, as in the Chesapeake Bay, and at even more southerly localities on the eastern coast of the United States."

To date the harp seal, *Phoca groenlandica* Erxleben, has not been found south of Trenton, New Jersey, where the record is considered extremely unusual since this species does not customarily stray south of its normal range in the circumpolar seas, south along the east coast of America normally to the Magdalen Islands, and perhaps to New England. Rhoads (1903) stated that it is a strikingly marked animal, being whitish with a broad black band along each side of the back. By contrast the harbor seal is variable in color, usually yellowish with irregular spots of dark brown, which accounts for the name "leopard seal." The harp seal is a larger species, reaching six feet and weighing from 500-800 pounds, according to Anthony (1928).

The gray seal, *Halichoerus grypus* (Fabricius), was discovered in the nets at Young's Million Dollar Pier, Atlantic City, New Jersey, after a storm in March, 1931. This record is also rather extraordinary since this species is generally not recorded south of Newfoundland, according to Goodwin (1935). This species, which may attain a length of eight to ten feet, may possibly wander as far south as the Chesapeake Bay; therefore, all seals should be photographed wherever observed and careful notes should be made of bodily characteristics, color, pattern and other pertinent facts. A large number of seals have been reported, but a majority of the descriptions given by laymen are wholly inadequate for making identification. Perhaps the harp seal and gray seal, both of which have not been reported off the coast of Maryland or Delaware or the Chesapeake Bay, may turn up as a result of increased vigilance.

HOODED SEAL

Cystophora cristata (Erxleben)

The hooded seal is a rare, occasional straggler in the Chesapeake Bay area from its more northern distribution in the colder parts of the North Atlantic and in parts of the Arctic Sea.

Cope (1865) was the first to record this species from the Chesapeake Bay, where he listed it twice (Cope, 1873). The first specimen was recorded in 1865 as "some species of *Cystophora* taken near Cambridge, Maryland, on an arm of the Chesapeake Bay, eighteen miles from salt water, by Mr. Daniel M. Henry." The specimen, it is said, "measured 6-3/4 feet, and weighed, when living, about 330 lbs." Joel A. Allen, (1884) commented, "Although Professor Cope adds, 'Whether this species is the *C. cristata* or *antillarum*, cannot be determined, owing to the imperfection of extant descriptions,' there is no reason for doubting that it was really the Crested Seal, a conclusion to which Professor Cope seems to have later arrived. Although Gray's suggestion anent the English specimen naturally arises, namely, transportation from the north in some ship, it seems more probable that they were really wanderers from the usual home of the species."

Rhoads (1903) quoting from the *American Naturalist*, Nov. 1883, pp. 1191, 1192, wrote, "A. E. Brown writes in *Forest and Stream* ... 'Although a few specimens of this seal have been seen on our shores [New Jersey], even as far south as the Chesapeake, yet its occurrence is sufficiently rare to be worthy of note, and at this season of the year, it may be inferred that a considerable part, at least, of the voyage was performed on an iceberg or floe.'"

According to Rhoads (1903) the hooded seal is by preference a dweller on the drift ice of high seas, away from rocky island or shores. It is combative and quarrelsome and exceedingly difficult to kill. It feeds on fish, crustaceans and mollusks. Owing to its scarcity it has a small commercial value.

This species grows to a large size, up to seven or eight feet. The color above is bluish black varied with small whitish patches, lighter beneath. The head and limbs are nearly uniform black. The males possess a movable muscular bag about a foot long extending from the nose to behind the eyes on the head, hence its name "hooded" seal. The following account of the capture of a seal

on the Eastern Shore does not mention the conspicuous cephalic crest or bag, but it probably refers to the hooded seal.

This amazing seal story has almost become a legend in the Chesapeake Bay Country, and Mr. Jerry D. Hardy, a principal in the Dorchester County High Schools, believes that the story may be a hoax. It concerns an encounter with a seal over 90 years ago at Worton Point near Chestertown, Kent County. The *Daily Banner* entitled the story in 1930 as "Seal Killed Years Ago at Cambridge" (see *Maryland Conservationist*, Vol. VII, No. 4), demonstrating a conflict in localities. At that time the river was frozen with the exception of air holes where ducks were bunched up. There Mr. Hampton Henry discovered this large seal on the ice, and fired both barrels of his shotgun at the animal, but it was able to amble into the water. Later a duck-hunter found that the seal had crawled back on the ice, and then apparently died from the wounds. Later the seal was exhibited in Baltimore, and the fur was retained by Mr. Henry and brought back to his family. Mr. Henry estimated that the seal weighed between 800 and 1000 pounds.

True (1906) has described a new genus and species of fossil seal from the Miocene of Maryland. Glover M. Allen (1930) stated "... there is evidence that in the Glacial period [the Atlantic walrus, *Odobenus rosmarus* (Linnaeus)] frequented [New England] shores, and left their bones even as far south as the Carolinas, at a time when, no doubt, cold currents extended much further south than now." DeKay (1842) described the remains of a "Fossil Atlantic Walrus," *Rosmarus virginianus* (DeKay), from Accomac County, Virginia, which is immediately adjacent to Worcester County, Maryland. The anterior portion of a skull, regarded as being of Pleistocene age, was discovered on the sea beach in 1827. Handley and Patton (1947) remarked, "Although the walrus has never occurred in Virginia in historical times and indeed probably not since glacial times, it is nevertheless included on this list since the remains which were found at Accomac appear to be identical with those of the modern walrus." Remains of the walrus have not definitely been found in Maryland, although Rhoads (1903) stated that "A portion of a mandible was found in southern Chester Co. [Pennsylvania] in 1900, probably found by fishermen in the Chesapeake Bay."

CANADIAN BEAVER

Castor canadensis canadensis (Kuhl)

At one time the Canadian beaver was one of the most abundant fur-bearing rodents ranging in the State. Before or at the turn of the Century, however, it was exterminated. Today, colonies are to be found in scattered localities, either from being stocked or from emigrating from other states.

Father Andrew White (1632) recorded beavers, probably in Southern Maryland, while Captain John Smith (1607-8) found a few "Beuers" probably in the vicinity of Little Falls in the District of Columbia. Henry Fleet (1632) visited the country about the juncture of the Potomac and Anacostia rivers, which was thickly settled, and the waters there were favorite fishing resorts, according to McAtee (1918). The Indian Village Nacostines (Anacostia) is specially mentioned by Fleet as the place where he obtained "800 weight of

beaver." This is good evidence of the abundance at that time of these animals in country easily reached from Anacostia. Collateral evidence is afforded by the name Beaver Dam Branch still applied to a stream flowing into Eastern Branch through the town of Benning. Burnaby (1775) mentions that beavers were to be found near the District of Columbia. Neither Cope (1873) nor Meshach Browning (1928), however, mention them from Maryland. Scharf (1882) stated that "The beaver especially was formerly abundant here, [Western Maryland] and built dams across the creek and river. Unhappily with the increase of population new demands for cleared lands drove away many of the interesting animals such as the beaver..."

Marye (1945), in speaking of the extinct mammals of Tidewater Maryland, asserted that "The beaver was at one time very common, but was exterminated by pelt-hunters and by the planters, who destroyed beaver-dams in order to drain swamps. The sluggish freshwater streams of the Eastern Shore seemed particularly suited to the beaver. In the eastern parts of Dorchester County, this animal once apparently was very numerous."

Hay (1920) has found fragments of the skeleton of the beaver in Bushey's Cavern, Cavetown, Washington County. While Stearns (1940, 1943) has discovered remains in Indian village sites at Little Round Bay Creek, a tributary of the Severn River in Anne Arundel County, and at the Hughes Site on the Potomac River in Montgomery County. Gidley and Gazin (1938) have also found remains of the beaver among the fossils of the Pleistocene vertebrate fauna from Cumberland Cave, Allegany County. Both Hay and Gidley and Gazin have identified the beavers as examples of the recent *Castor c. canadensis*.

In 1928 the *Maryland Conservationist* (5 (1)) reported that a dam made by beavers was found near Hagerstown, Washington County. The "dam constructed by beavers, the one known to exist in the East, was discovered in Horse Valley, Franklin County [Pennsylvania] near here. The dam is across the stream a short distance from the road at the creek fording on Bear Valley Road." The beavers were reported to be "not domesticated."

Later the *Maryland Conservationist* (1934, 11 (2)) reported the capture of beaver near Flintstone, Allegany County. The specimens were found at Muley's Branch. The beavers were lassoed and liberated in the vicinity of Muddy Creek in Garrett County.

Porter (1939) stated that beaver were to be found at the following localities in Maryland: Head of the Chester River; Upper Potomac, near Germania, Garrett County; Town Creek, Allegany County; Millington, Kent County. In 1934 two beavers were liberated in Delaware, and it is thought that the specimens from the Eastern Shore of Maryland may have been descendants of these two individuals. Bonwill and Owens (1939) in an article entitled "The Return of a Native," discussed in great detail the distribution and general habits of the beaver observed in this State. Arner (1949) mentions nine localities in Western Maryland where the beaver has been observed.

An interesting account of the beaver in Baltimore County has been left by an anonymous writer in the files of the Maryland Academy of Sciences. "Ed. O'Donovan told me, Zephemiah Poteet of Cockeysville has seen beavers in Beaver

Dam Run when he was a boy. I visited him in June 23, 1913. He said that 70 years ago as a boy he had fished all along the stream and that the old slave who went with him knew the stream 30 or 40 years before, had never seen any, but that he had heard some talk about beavers, but it must have been considerably over 100 years since any were there."

No one knows when the beaver was finally extirpated in Maryland, but on the basis of its disappearance in Pennsylvania (Rhoads, 1903) and New Jersey (Stone, 1908) it must have disappeared in the lowlands about 150 years ago. In West Virginia it persisted up to 1907, according to F. E. Brooks (1911), and it may be safe to assume that some beaver were left in Western Maryland less than 100 years ago. Scharf (1882), on the authority of Uhler, mentioned that they were present in Western Maryland.

CANADA PORCUPINE

Erethizon dorsatum dorsatum (Linnaeus)

The porcupine in Maryland has never enjoyed a wide distribution or any great abundance. In fact, so few definite records exist that its occurrence in our State was considered hypothetical. It is a species of the spruce and hemlock forests of northeastern United States, although in Maryland this ecological preference did not seem to restrict the porcupine's movements.

Lugger (1881) discussed briefly the distributional records of the porcupine in Maryland with an enumeration of the following locality records:

Allegany County: A specimen was deposited in the Maryland Academy of Sciences at that time (1881).

Frederick-Washington County: Blue Ridge Mountains.

Howard County: Ellicott City.

Hay (1920) records some skeletal parts from the Bushey Caverns, Cayetown, Washington County, among Pleistocene vertebrate fossils. Gidley and Gazin (1938) also report fifteen determinable specimens, including the greater part of three skulls and 12 broken lower jaws, from Cumberland Cave, Allegany County. Both Hay and Gidley and Gazin regard the skeletal remains as examples of *Erethizon d. dorsatum*.

In a series of photographs by W. B. Tyrrell, entitled "Wild Life of Maryland," published in the rotogravure section of the *Sunday Sun* (October 18, 1936), is a picture of a porcupine. Although it is believed that this picture represented a Michigan specimen the caption stated, "This prickly creature has never been common in Maryland though may still be found in some of the wilder mountain regions."

The *Maryland Conservationist* (1948, 25 (1)) cited the following, "Regional Warden Kerns comes up with an unusual mammal tale. This time it is the killing of a porcupine on March 22nd, 1948 by Morris McCormick, on his farm near McCormick Avenue, between Rosedale and Raspeburg [Baltimore County]. Mr. Kerns reports having seen a bear in this area during the fall of 1947." A somewhat tongue-in cheek version of this tale was read recently which lends less credence to the record.

Rhoads (1903) reported that the porcupine had been recorded from the two Pennsylvania counties, Somerset and Fulton, which are immediately adjacent to Maryland. It seems likely that a porcupine would be very difficult to mistake for any other mammal, so that recent records must be tentatively accepted. Provisionally it must be retained on the list of mammals which may not have been extirpated. It is reasonable to assume that specimens may emigrate from Pennsylvania where they are managing to hold their own.

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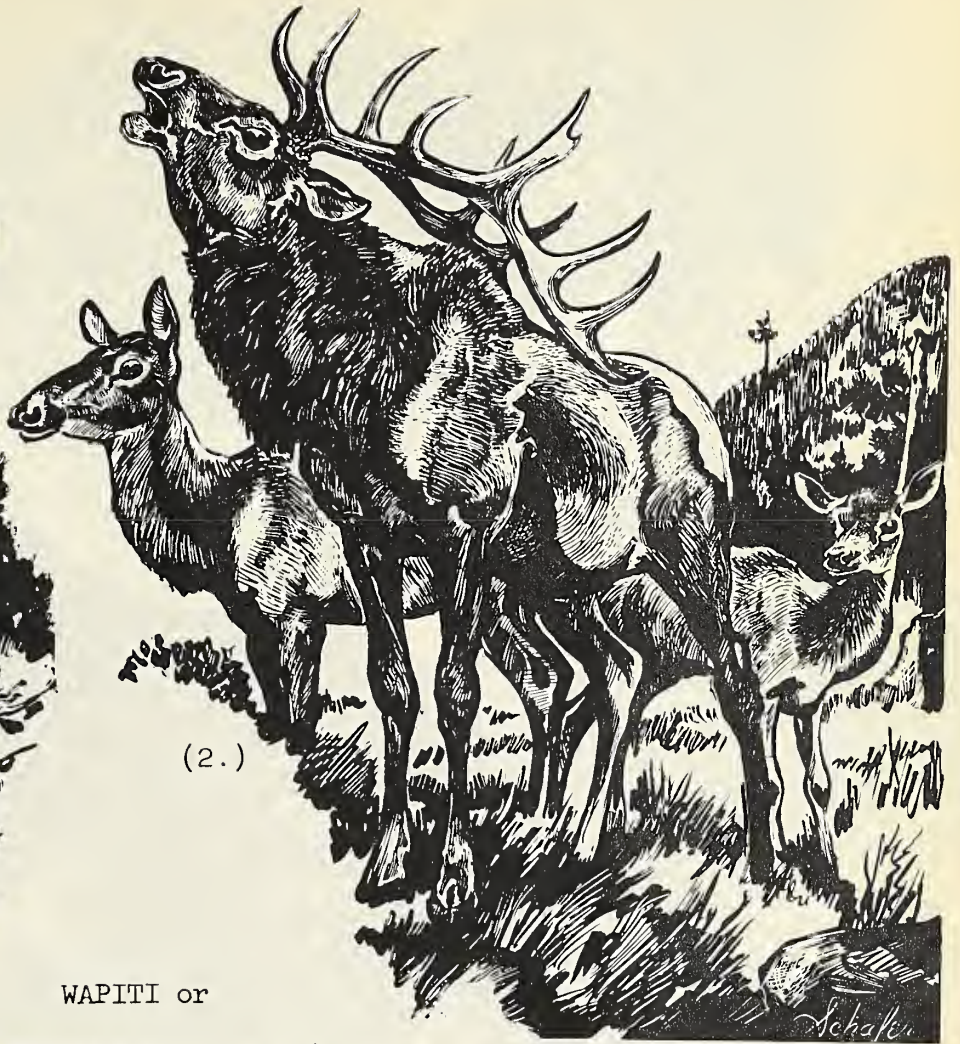
The thirteen-lined ground squirrel, *Citellus tridecemlineatus tridecemlineatus* (Mitchill), another rodent, is possibly represented in Maryland by the portion of a skull. Provisionally, the incomplete left ramus of a mandible (USNM 12054) is referred by Gidley and Gazin (1938) to the above species, but the designation of the same is as follows, *Citellus* cf. *tridecemlineatus*,* indicating that the animal may be identified with a fossil or related species. The discovery of the *Citellus* in the Cumberland Cave, Allegany County, among the Pleistocene fossil remains, would indicate that this species or a fossil relative to the living form inhabited Maryland. The living species *C. t. tridecemlineatus* does not occur in Maryland, but ranges throughout the states of Wisconsin, Illinois, Indiana, and Michigan, eastward to central Ohio. According to Hamilton (1943) it was first observed in Lancaster, Ohio in 1933, and "Appears to be extending its range in eastern and northeastern Ohio." Gidley and Gazin summarized their opinion of the *Citellus* remains by stating "The absence of more complete material prohibits a satisfactory comparison with the Recent form."

*This qualifying symbol "cf." is used to indicate the fact that the specimen is to be compared to the species following the designation. Schenk and McMasters (1948) state that terms interpolated by authors between the generic and the trivial name are incorrectly used, since the International Rules of Zoological Nomenclature make no provision for interpolations other than subgeneric names.

Maryland Mammals



(1.)



(2.)

WAPITI or
AMERICAN ELK (1. & 2.) ,)

(Extirpated)

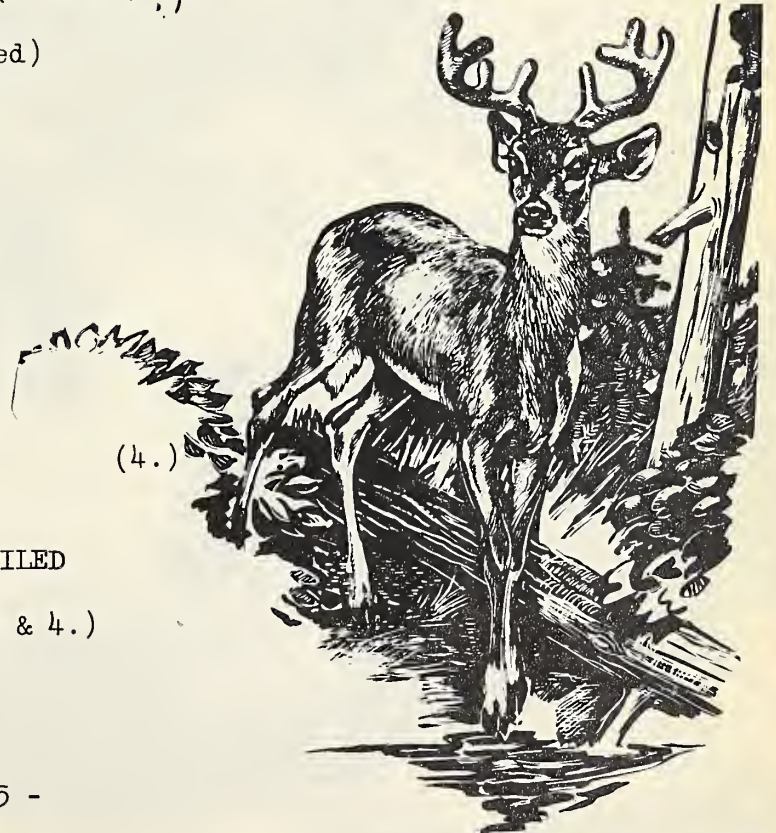


(3.)

VIRGINIA WHITE-TAILED

DEER (3. & 4.)

(Once Extirpated now Common)



(4.)

Maryland Mammals

FISHER (2.)

(Extirpated)



(2.)

EASTERN MARTEN (1.)

(Extirpated)

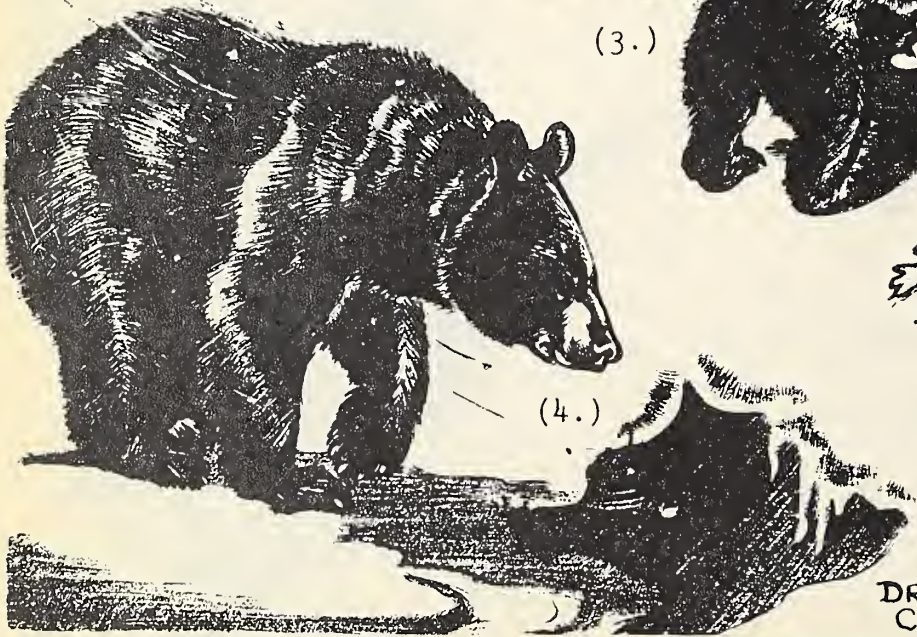


EASTERN BLACK

BEAR (3., 4. & 5.)
(Uncommon)



(3.)



(4.)



(5.)

DRAWINGS BY
CHARLES SCHAFER

Maryland Mammals

EASTERN COUGAR (1.)

(Extirpated)

ORIGINAL DRAWING
BY ROMEO MANSUETI

(1.)



CANADIAN LYNX (2.)

(Extirpated)

(2.)

SCHAFER



(3.)



EASTERN BOBCAT (3. & 4.)

(Extant but Uncommon)

(4.)



Maryland Mammals



(1.)

(2.))
COYOTE

(Introduced,
very rare)



(2.)

RED FOX (1.)

(Introduced,
abundant)



(3.)

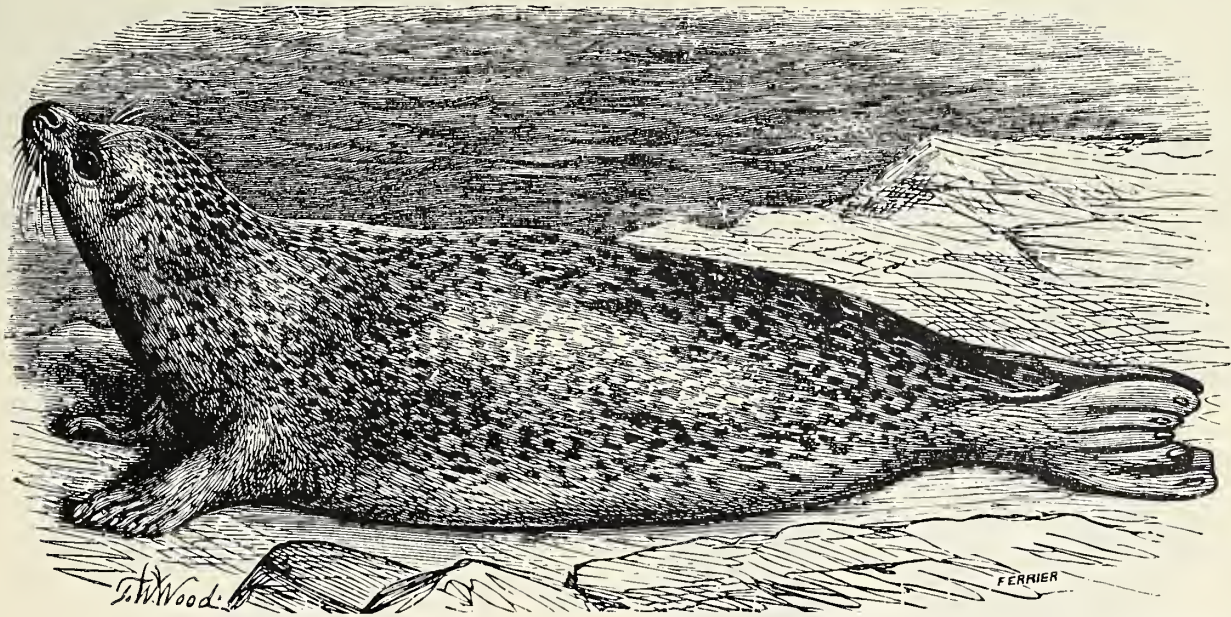


(4.)

TIMBER WOLF (3. & 4.)

(Extirpated)

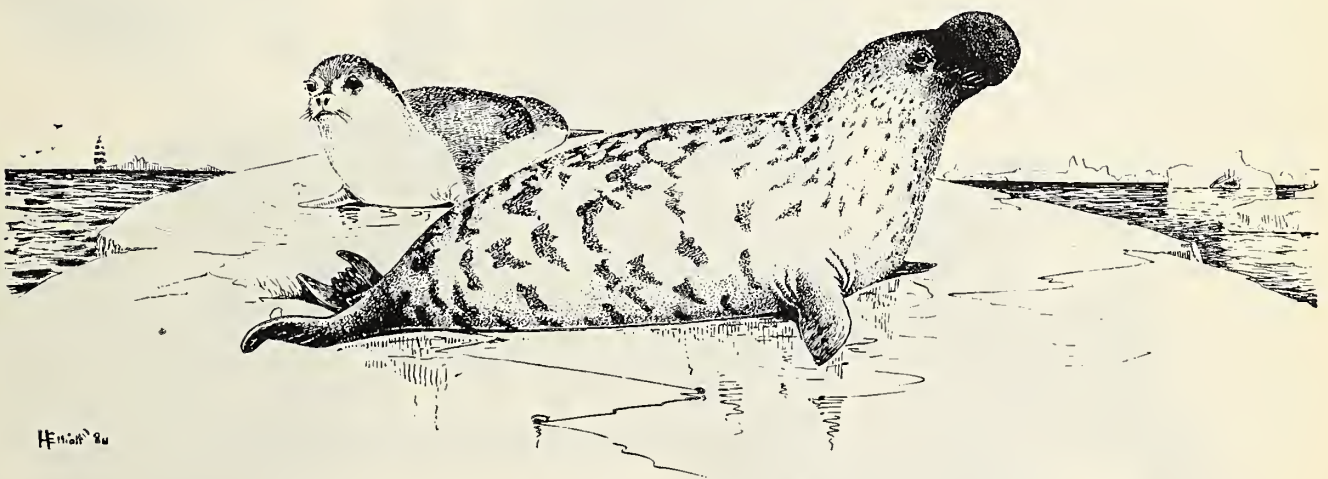
DRAWINGS BY CHARLES SCHAFER
WITH PERMISSION MICHIGAN DEPARTMENT
OF CONSERVATION



HARBOR SEAL (1.)

(Straggler into Maryland waters)

DRAWING BY
F.W. WOOD. FROM
LYDEKKER'S ROYAL
NATURAL HISTORY.



HOODED SEAL (2.)

(Very rare straggler into Maryland waters.)

DRAWING BY
HENRY W. ELLIOTT
COURTESY U.S. FISH AND
WILDLIFE SERVICE

Maryland Mammals

PLATE VII



(1.)



(2.)

CANADIAN PORCUPINE (1. & 2.)

(Very rare (??))



(3.)

THIRTEEN-LINED GROUND SQUIRREL

(Extirpated - perhaps a fossil?)



(4.)



(5.)



(6.)

CANADIAN BEAVER (4., 5. & 6.)

(Once extirpated, now introduced or immigrated)

DRAWINGS BY CHARLES SCHAFER
COURTESY MICHIGAN CONSERVATION
DEPARTMENT

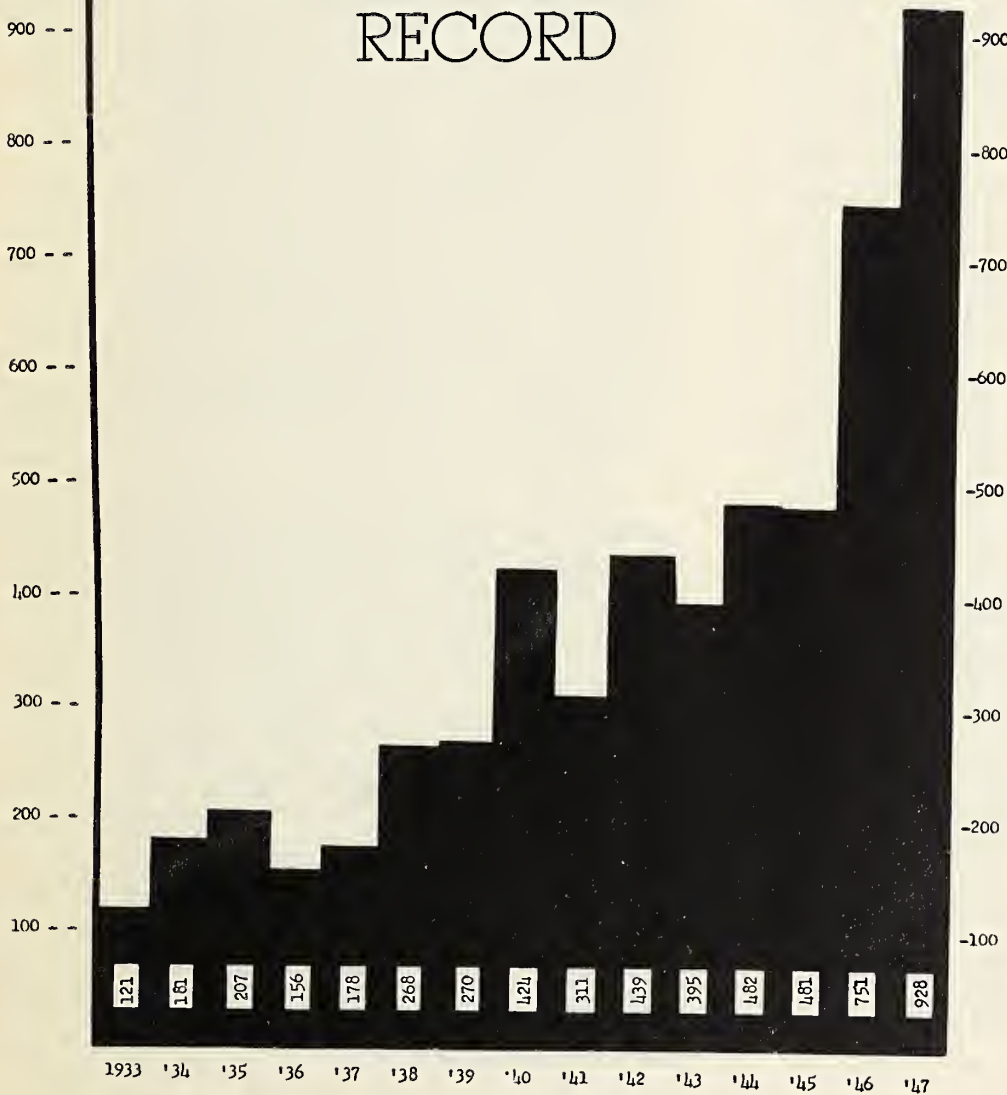
VIRGINIA

WHITE - TAILED

DEER



MARYLAND DEER KILL RECORD



Virginia White-tailed deer fighting in autumn, during which time bucks are often found with their antlers locked. Antlers serve their possessors principally for fighting with rival bucks for the possession of does, and their importance disappears with the end of the mating season.

The annual kill of white-tailed deer in Maryland is expressed in the above graph. Twenty to thirty percent can be added to these figures to include items not accounted for such as kills on highways, railroads, poaching, miscellaneous violations, natural causes, etc.

COURTESY MARYLAND GAME AND INLAND FISH COMMISSION

MAMMALOGISTS OF MARYLAND

Although no extensive study of Maryland mammals has appeared aside from the references listed below - a small group of mammalogists have steadily contributed papers and observations to various journals. All of them are interested in the conservation of our rare and vanishing species, and most are particularly concerned with receiving life history data, interesting observations, and skins and skulls, preferably both, with records. An alphabetical account is appended for individuals wishing to obtain specific information or wishing to add specimens to collections. The following institutions have mammal collections from Maryland: Natural History Society of Maryland; United States National Museum; Reading Public Museum and Art Gallery, Reading, Pennsylvania; Museum of Zoology, University of Michigan, Ann Arbor, Michigan; Carnegie Museum, Pittsburgh, Pennsylvania; Cleveland Museum of Natural History, Cleveland, Ohio; Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania; Patuxent Research Refuge, Laurel, Maryland.

The following individuals are interested in the mammals of Maryland and the District of Columbia:

- Bray, Robert, Library of Congress, Washington, D. C. Moles and Shrews.
- Calhoun, John B., Hamilton Station, Roscoe B. Jackson Memorial Lab., Box 78, Bar Harbor, Maine. North American census of small mammals.
- Cooper, John E., Natural History Society of Maryland, 2101 Bolton Street, Baltimore 17, Maryland. Life Histories and Distribution.
- Davis, David E., Rodent Ecology Project, School of Hygiene and Public Health, 615 North Wolfe Street, Baltimore 5, Maryland. Ecology of rodents and insectivores.
- Dozier, Herbert L., Fur Resources Division, U. S. Fish and Wildlife Service, Southwestern University, Lafayette, Louisiana. Muskrats, raccoons, and marsh mammals.
- Flyger, Vagn, Department of Research and Education, Chesapeake Biological Laboratory, Solomons, Maryland. Calvert County mammals.
- Gardner, Marshall C., Biologist, Biological Surveys, Branch of Wildlife Research, Fish & Wildlife Service, United States National Museum, Washington 25, D. C. All phases of Maryland mammalogy. Specimens from all of Maryland especially desired for comparative purposes.
- Gentile, Joseph, Natural History Society of Maryland, 2101 Bolton Street, Baltimore 17, Maryland. Rodents and other small mammals.
- Hamlet, John, Primate Research Farm, Pritchardville, South Carolina. Life histories, control, and food habits.
- Hampe, Irving E., Curator of Mammals and Birds, Natural History Society of Maryland, 2101 Bolton Street, Baltimore 17, Md., Mammals of Baltimore and Vicinity.
- Handley, Charles O., Jr., Museum of Zoology, University of Michigan, Ann Arbor, Michigan. Virginia mammals, but familiar with taxonomic and distributional problems of Maryland mammals.
- Harris, Van T., School of Hygiene and Public Health, 615 N. Wolfe St., Baltimore 5, Md. - Populations and habitat selection, particularly of muskrats.
- Howell, A. Brazier, Johns Hopkins University. Baltimore, Maryland. Comparative anatomy and ecology.
- Jackson, Hartley, H. T., United States National Museum, Washington 25, D. C. Life histories, ecology, distribution.
- Jackson, Ralph W., Cambridge, Maryland. Mammals of Cambridge area.
- Johnson, David, Curator of Mammals. United States National Museum, Washington 25, D. C. Taxonomy of Maryland mammals.
- Kellogg, Remington, Director, United States National Museum, Washington 25, D. C. Whales, bats, shrews, etc., ecology and distribution.
- Kolb, Haven, Natural History Society of Maryland, 2101 Bolton Street, Baltimore 17, Maryland. Habits and occurrence of Maryland mammals.
- Lambert, Robert, Natural History Society of Maryland, 2101 Bolton Street, Baltimore 17, Md., Harford County mammals.
- Lamore, Donald H., 1920 Grace Church Road, Silver Spring, Maryland. Small mammals and their distribution.
- Llewellyn, Leonard, Patuxent Research Refuge, Laurel, Maryland. Mammals of Eastern Shore and Western Maryland. Retains private collection.
- Lynn, W. Gardiner, Catholic University, Washington, D. C. Bats.
- Meanley, Brooke, Division of Birds, U. S. National Museum, Washington 25, D. C. Food habits and ecology of large mammals.
- Petrides, George A., Jr., National Capital Parks Service, United States Department of the Interior, Washington 25, D. C. Mammals of the District of Columbia.
- Poole, Earle L., Reading Public Museum and Art Gallery, Reading, Pennsylvania. Mammals of the Eastern Shore.
- Preble, Edward A., Assoc. Editor, Nature Magazine, 1214 Sixteenth Street, Washington 6, D. C. Mammals of District of Columbia.
- Pruitt, William, Department of Zoology, University of Michigan, Ann Arbor, Michigan. Distribution and ecology of Maryland mammals.
- Schantz, Viola S., (Miss) U. S. Fish & Wildlife Service, Washington 25, D. C. Mammals of District of Columbia.
- Stewart, Robert, Patuxent Research Refuge, Laurel, Maryland. Ecology and distribution of Maryland mammals.
- Stickel, Lucille (Mrs.), Patuxent Research Refuge, Laurel, Maryland. Ecology, distribution and food habits of Maryland Mammals.
- Stickel, William H., Patuxent Research Refuge, Laurel, Maryland. Ecology, distribution and food habits of Maryland Mammals.
- Uhler, Francis M., Patuxent Research Refuge, Laurel, Maryland. Food habits and ecology of Maryland Mammals.
- Vaughn, Ernest A., Director, Maryland Game and Inland Fish Commission, Munsey Building, Baltimore 2, Maryland. Food habits and Conservation.
- Warbach, Oscar, Patuxent Research Refuge, Laurel, Maryland. Ecology and food habits of Maryland Mammals.
- Wetmore, Alexander, Secretary, Smithsonian Institution, Washington 25, D. C. Taxonomy, Distribution and ecology of Maryland Mammals.

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The Librarians in the Maryland Room of the Enoch Pratt Free Library have been very cordial and helpful in tracking down some of the most obscure references. The Library of the Natural History Society of Maryland has provided some articles of value, and Dr. Edmund B. Fladung, president of the Natural History Society of Maryland, and Mr. Herbert C. Moore, editor of the *Maryland Naturalist*, have been very interested in the subject and have given me many leads and aids. Mr. Haven Kolb, Jr., also contributed many excellent suggestions, and skillfully edited the manuscript.

The editor of the *Michigan Conservation*, magazine of the Michigan Department of Conservation, very kindly extended permission to reproduce some of the excellent mammal illustrations of Mr. Charles E. Schafer. Many other individuals have indirectly aided me, and I wish to express my sincerest appreciation to them.

REFERENCES

The following references contain material pertaining to mammals of Maryland and the District of Columbia. Almost all of them have been examined for information pertaining to extirpated and vanishing mammals. Most of the references, however, concern mammals which have not been exterminated; most of these mammals nevertheless, are not abundant and some are quite rare. Essentially, this bibliography is complete with respect to Maryland mammals. Papers and articles concerned with the hunting, trapping, and conservation of game animals have been ignored unless they contained material of scientific significance to mammalogists.

- Alsop, George. 1666. A character of the Province of Maryland. In Hall, Clayton Colman. Narratives of early Maryland. 1910. N. Y. 341-387.
- Allen, Glover M. 1916. Bats of the genus *Corynorhinus*. Bull. Mus. Comp. Zool., 60:333-356, 1 pl.
- _____. 1930. The walrus in New England. Journ. Mamm. 11:139-145.
- _____. 1941. Pigmy sperm whale in the Atlantic. Zool. Ser. Field Mus. Nat. Hist. 27:17-37.
- _____. 1942. Extinct and vanishing mammals of the Western Hemisphere. Amer. Committee for International Wildlife Protection. xv & 620, 111.
- Allen, Harrison. 1893. A monograph of the bats of North America. U. S. Nat. Mus. 43, ix & 198, 38 pl.
- Allen, Joel Asaph. 1876. The American bisons, living and extinct. Mem. Geol. Surv. Kentucky. 1(2):ix & 1-246, 12 pl., map.
- _____. 1880. History of the North American pinnipeds, a monograph of the walruses, sea-lions, sea-bears and seals of North America. U. S. Geol. Surv. Terr., F. V. Hayden in Charge, Misc. Pub. 12, xvi & 785, 111.
- _____. 1884. The seals and walruses. In The fisheries and fishery industries of the United States. Section I. Natural History of useful aquatic animals. U. S. Comm. Fish and Fisheries. 2 vol. 1:33-74, 2: 277 pl.
- _____. 1913. Ontogenetic and other variations in muskoxen, with a systematic review of the muskox group, recent and extinct. Mem. Amer. Mus. Nat. Hist., Ser. 2, 1:101-226, 11-18 pl., 45 fig.
- Alvord, Clarence W., and Lee Bidgood. 1912. The first explorations of the Trans-Allegheny region by the Virginians, 1650-1674. Cleveland. 1-275.
- Andrews, E. A., and R. P. Cowles. 1948. An account of a whale skeleton. Maryland Naturalist, 18(3):43-44, 1 fig.
- Anonymous (?). 1884. [Note on a porpoise near Georgetown, D. C.]. The Pastime. 3:16.
- Anthony, Harold E., et al. Probably by William Palmer 1917. Animals of America. Garden City, New York, 1-357, 111.
- _____. 1928. Field Book of North American mammals. Putnam & Sons. N. Y., xxvi & 674, 150 fig. 48 pl.
- Arber, Edward. 1910. Travels and works of Captain John Smith, president of Virginia and Admiral of New England, 1580-1631.
- Archer, J., 1774. Dissertation of an amphibious animal discovered in [Baltimore Co., Md.] Proc. Amer. Philos. Soc., 22:87.
- Arner, Dale. 1949. Western Maryland beaver. Maryland Conservationist. 26(2): 23-24, 1 map.
- Audubon, John James and John Bachman, 1849-54. The quadrupeds of North America. 3 vol., 1:viii-383, 50 pl.; 2:i-335, 50 pl.; 3:1-348, 50 pl., New York.
- Bailey, Harold H., 1920. A new fox squirrel from the Eastern Shore of Maryland. Bailey Mus. & Libr. Nat. Hist. Bull. 1:1.
- Bailey, John Wendall, 1946. The mammals of Virginia. Privately printed. Richmond, 1-416, 111.
- Bailey, Vernon, 1896. List of mammals of the District of Columbia. Proc. Biol. Soc. Wash., 10:93-101.
- _____. 1896. Occurrence of the native wood rat at Washington, D. C. Science. N. S., 3(69):628.
- _____. 1900. Revision of American voles of the genus *Microtus*. N. Amer. Fauna. 17:1-88, 17 fig., 5 pl.
- _____. 1923. Mammals of the District of Columbia. Proc. Biol. Soc. Wash., 36:103-138.
- _____. 1926. Zoology - Mammals of the vicinity of Washington. Journ. Wash. Acad. Sci., 16:441-445.
- _____. 1937. A typical specimen of the Eastern elk from Pennsylvania. Journ. Mamm. 18:104.
- _____. 1937. The Maryland muskrat marshes. Journ. Mamm. 18:350-354, 3 fig.
- Baird, Spencer Fullerton, 1857. Mammals of North America. In Reports of explorations and surveys for a railroad from Mississippi River to Pacific Ocean. 8(1):xlviii-757, 44 pl.
- _____. 1859. Mammals of North America; the descriptions of species based chiefly on the collections in the museum of the Smithsonian Institution. 1:xxxiv-752, 60 pl., Philadelphia.
- Baltimore Evening Sun, 1948. Bobcats still here. Balto. Eve. Sun. Feb. 18, 1948, 1 111.
- Baltimore Morning Sun, 1912. [Large jack rabbit killed in Baltimore County]. December 16, 1912.
- _____. 1914. [Three hundred jack rabbits liberated in Baltimore County]. February
- _____. 1936. Hopkins man describes whales of State, both living and dead. May 6, 1936.
- _____. 1949. Lion reported loose on 'Shore. January 8, 1949.
- Bangs, Outram, 1896. A review of the squirrels of Eastern North America. Proc. Biol. Soc. Wash., 10:145-167, 3 pl.
- Barbour, Thomas & Glover M. Allen, 1922. The white-tailed deer of the Eastern United States. Journ. Mamm. 3(2): 65-78, 2 pl.
- Barry, Edwin, 1949. Musquash iss Vamoos. Md. Conserv., 26(1):4-5, 1 fig.
- Berry, Charles T., 1940. A Miocene dog from Maryland, Proc. Biol. Soc. Wash., 85:159-161, 1 fig.
- Bole, Benjamin P., Jr., & Philip N. Moulthrop. 1942. The Ohio Recent Mammal collection in the Cleveland Museum of Natural History. Sci. Pub. Cleveland Mus. Nat. Hist. 5(6):83-181.
- Bonwill, Allan H., 1941. Blackwater: a story of the marshlands in Dorchester County, Maryland. Md. Conserv. 18(4):14-15.
- Bonwill, A. H., and H. B. Owens. 1939. The return of a native [*Castor*]. Bull. Nat. Hist. Soc. Md., 10(4): 34-45, 3 maps.
- Brayton, A. W., 1882. Report on the mammals of Ohio. Rept. Geol. Surv. Ohio. 4(1):3-185.
- Brooks, Alonzo B., 1923. Reappearance of beavers in West Virginia. Journ. Mamm. 4:191.
- _____. 1929. Mammals of West Virginia. In the W. Va. Encyclopedia. Ed. 1, xxiv-1052 pp. Charleston, West Virginia.
- Brooks, Fred E., 1911. The mammals of West Virginia. Rept. W. Va. State Bd. Agric. ... 1910. (20):9-30.
- Browning, Meshach, 1928. Forty-four years of the life of a hunter. Reprinted edition from 1846. Reprinted in 1936 by R. Getty Browning, 1012 Harvey Street, Raleigh, North Carolina. (\$3.00).
- Browning, R. Getty, 1947. The ghost of "Spook Hollow." The Glades Star, Garrett County Historical Society, (27):260.
- Bures, Joseph A., 1948. Mammals of a limited area in Maryland, an ecological study in the Bare Hills-Lake Roland Area. Md. Nat., 18(4):58-72, 5 pl., 2 fig.
- Burnaby, Andrew, 1798. Travels through the middle settlements in North America in the years 1759 and 1760 ... London, T. Payne, xix-209.
- Burt, William H., 1943. Changes in the nomenclature of Michigan mammals. Occ. Papers, Mus. Zool., Univ. Mich., (481):1-9.
- _____. 1946. The mammals of Michigan, Univ. Mich. Press. Ann Arbor, 1-303, 13 col. pl., 107 fig., 67 maps.
- Calhoun, John B., 1948. Mortality and movement of brown rats (*Rattus norvegicus*) in artificially supersaturated population. Journ. Wildlife Management, 12(2):167-172, 1 fig.
- Case, E. C., 1904. Report of the Maryland Geological Survey. Miocene. Md. Geol. Surv., Baltimore.
- Clayton, John, 1694. On the beasts and serpents of Virginia, Philos. Trans. Royal Soc. London, 18(210):121-135.
- Cohen, Elias, 1942. *Myotis keenii septentrionalis* (Trouessart) in Maryland. Journ. Mamm. 23:96.
- _____. 1944. A new homing record for the large brown bat (*Eptesicus fuscus fuscus*) Md., Jour. Nat. Hist. Soc. Md., 14:65-67, 2 111.

- Collins, R. Lee & W. Gardner Lynn, 1936. Fossil turtles from Maryland. *Proc. Amer. Philos. Soc.*, 76(2):151-173, 4 pl.
- Cope, Edward Drinker, 1865. [Hooded seals in the Chesapeake Bay]. *Proc. Acad. Nat. Sci. Phila.*, 273.
- _____. 1865. [The black right whale, *Balaena glacialis* Bonnaterre, on the coast of Maryland]. *Proc. Acad. Nat. Sci. Phila.*, 168.
- _____. 1867. An addition to the vertebrate fauna of the Miocene Period, etc. *Proc. Acad. Nat. Sci. Phila.*, 19:142.
- _____. 1867. [Fossil cetacean, *Rhabdosteus latiradix* Cope, in Maryland]. *Proc. Acad. Nat. Sci. Phila.* 132-145.
- _____. 1871. Extinct *Batrachia*, *Reptilia* and *Aves* of North America. *Trans. Amer. Philos. Soc.*, 14:125.
- _____. 1873. Sketch of the zoology of Maryland. In Walling and Gray's new topographical atlas of Maryland. O. W. Gray. Philadelphia, 16-18.
- Coues, Elliott, 1871. Former eastward range of the buffalo. *Amer. Nat.*, 5:719-720.
- _____. 1877. Fur-bearing animals; a monograph of North American *Mustelidae*. *Misc. Pub. U. S. Geol. Surv.*
- Terr., F. V. Hayden, U. S. Geologist, xiv-348, 20 pl.
- Joel A. Allen, 1877. Monographs of North American *Rodentia*. *Rept. U. S. Geol. Surv. Terr.* 11(1-12): x-1091, 5 pl.
- Covington, Harry Franklin, 1915. The discovery of Maryland, or Verrazano's visit to the Eastern Shore. *Md. Hist. Mag.*, 199-217.
- Dargan, Lucas M. & William H. Stickel, 1949. An experiment with snake trapping. *Copeia*. (4):264-268, 1 fig.
- Davis, David E., 1948. The survival of wild brown rats on a Maryland farm. *Ecology*, 29(4):437-448, 6 fig.
- _____. [1948]. Principles of rat management. [School of Hyg. & Pub. Health, J. H. Univ.], 1-4, 1 fig.
- _____. and John T. Emlen, Jr., 1948. The placental scar as a measure of fertility in rats. *Journ. Wildlife Management*, 12(2):162-166.
- _____. and Octavia Hall, 1948. The seasonal reproductive condition of male brown rats in Baltimore, Maryland. *Physiol. Zool.*, 21(3):272-282, 3 fig.
- Davis, David E., J. T. Emlen and A. W. Stokes, 1948. Studies on home range in the brown rat. *Journ. Mamm.* 29(3):207-225.
- David, David E. and C. P. Winsor, 1948. The growth of brown rats in nature. Unpub. Ms.
- Davis, Ray P., 1946. Grounded whale like "Pop" Bennett's "Bessie." *The Eve. Sun*. January 19, 1946.
- DeKay, James E., 1842. Zoology of New York. Part I. *Mammalia*. Albany, xv-146, 33 pl.
- Denmead, Talbott, 1941. First deer park established in U. S. was in Maryland. *Md. Conserv.*, 18(1):6-7.
- Doyle, William E., 1881. History of the buffalo. *Amer. Nat.*, 15:119-124.
- Dozier, Herbert L., 1944. Muskrat investigations at the Blackwater National Wildlife Refuge, Maryland. *Md. Conserv.* 1-4, 3 fig.
- _____. 1944. Color, sex ratios and weights of Maryland muskrats. II. *Journ. Wildlife Management*, 8:165-169.
- _____. 1947. Salinity as a factor in Atlantic Coast tidewater muskrat production. *Trans. 13th N. A. Wildlife Conf.* 398-420.
- _____. 1948. Estimating muskrat populations by house count. *Trans. 13th N. A. Wildlife Conf.* 372-392.
- _____. 1948. Color mutations in the muskrat (*Ondatra z. macrodon*) and their inheritance. *Journ. Mamm.* 29(4):393-405.
- _____. 1948. A new eastern marsh-inhabiting race of raccoon. *Journ. Mamm.* 29:286-290, 2 pl.
- _____. and Robert W. Allen, 1942. Color, sex ratios and weights of Maryland muskrats. I. *Journ. Wildlife Management*, 6:294-300.
- _____. and Harold E. Hall, 1944. Observations on the Bryant fox squirrel, *Sciurus niger bryanti* Bailey. *Md. Conserv.* 1-12, 7 fig., 1 table.
- _____. Hardy, T. M. and M. H. Markley, 1948. Fur characteristic of two eastern raccoons. *Journ. Mamm.* 29:383-393, 2 pl.
- _____. Markley, Merle H. and L. M. Llewellyn, 1948. Muskrat investigations in the Blackwater National Wildlife Refuge, Maryland, 1941-1945. *Journ. Wildlife Management*. 12(2):177-190, 1 pl.
- Ducatel, J. T., 1837. Outlines of the physical geography of Maryland, embracing its prominent geological features. *Trans. Md. Acad. Sci. Lit.*, 2:24-54, 1 map.
- Elliott, Charles, (Editor). 1942. *Fading Trails*. N. Y., 1-279, 111.
- Elliot, Daniel Giraud, 1901. A synopsis of the mammals of North America and the adjacent seas. *Field Columbian Mus., Zool. Ser.*, 2:xv-471, 49 pl., 94 fig.
- Ely, Alfred, et al. 1939. North American big game. New York & London, xxi-533, 34 pl., 27 tables.
- Emlen, John T., 1944. Device for holding live wild rats. *Journ. Wildlife Management*. 8(3):264-265.
- Emlen, John T., Jr., and David E. Davis, 1948. Determination of reproductive rates in rat populations by examination of carcasses. *Physiol. Zool.* 21(1):59-65, 2 fig.
- _____. Stokes, A. W., & C. P. Winsor, 1948. The rate of recovery of decimated populations of brown rats in nature. *Ecology*. 29(2):133-145, 7 fig.
- _____. and David E. Davis, 1949. Methods for estimating populations of brown rats in urban habitats. *Ecology*. 30(4):430-442, 6 fig.
- _____. [ca. 1945]. The rat population of Baltimore, Maryland. [Unpub. Ms.]
- _____. 1947. Baltimore's community rat control program. *Amer. Journ. Pub. Health*. 37(6):721-727.
- Fisher, A. K., 1893. Hawks and owls of the United States. *Bull.* 3; Div. Ornith. & Mamm. 59-141.
- _____. 1896. Food of the barn owl (*Strix pratincola*). *Science*. N. S., 3:623.
- Fleet, Henry, 1632. A brief journal of a voyage made in the bark *Virginia*, to Virginia and other parts of the Continent of America. In Scharf, J. Thomas. *History of Maryland*. John B. Piet, Baltimore. 1:16.
- Footner, Hulbert, 1944. Rivers of the Eastern Shore. *Seventeen Maryland rivers*. Farrar & Rinehart, N. Y. 1-375, 111.
- Fowler, Henry W., 1915. *Delphinus* and *Phocaena* in the Delaware. *Science*. 42:798-799.
- Gardner, Marshall C., 1946. A new cotton rat from Virginia. *Proc. Biol. Soc. Wash.*, 59:137.
- _____. 1950. A list of Maryland mammals. Part I. Marsupials and insectivores. *Proc. Biol. Soc. Wash. In Press*
- _____. 1950. A list of Maryland mammals. Part II. Bats. *Proc. Biol. Soc. Wash. In Press*.
- Garretson, Martin S., 1938. The American bison: The story of its extermination as a wild species and its restoration under Federal protection. New York Zoological Society. xii-254, 111.
- Gaughran, G. R. L., 1945. A key to the genera of rodents found in Pennsylvania based on skull and mandible characteristics. *Proc. Penn. Acad. Sci.* 19:49-57, 1 pl.
- Gazin, Charles Lewis, 1933. The status of the extinct American "eland." *Journ. Mamm.* 14:162-164.
- Gentile, Joseph, 1949. A case of partial albinism in the short-tailed shrew. *Md. Nat.* 19(1):11-12.
- George, J. L. and J. George, 1948. *Vulpes*, the red fox. E. P. Dutton & Co., Inc., N. Y., 1-184, 111. [*Foxes of Maryland Piedmont*].
- _____. and _____. 1949. *Vison*, the mink. E. P. Dutton & Co., Inc., N. Y. 1-184, 111. [*Minks of Maryland Piedmont*].
- Gidley, James Williams, 1913a. An extinct American eland. *Smithson. Misc. Coll.*, 60(27):1-3, 1 pl.
- _____. 1913b. Preliminary report on a recently discovered Pleistocene cave deposit near Cumberland, Maryland. *Proc. U. S. Nat. Mus.* 46:93-102, 8 fig.
- _____. 1920a. A Pleistocene cave deposit of Western Maryland. *Ann. Rept. Smithsonian. Inst.* for 1918. 281-287, 6 pl.
- _____. 1920b. Pleistocene peccaries from the Cumberland Cave deposit. *Proc. U. S. Nat. Mus.* 57:651-678, 13 fig., 2 pl.
- _____. and Charles L. Gazin, 1933. New *Mammalia* in the Pleistocene fauna from Cumberland Cave. *Journ. Mamm.* 14:343-357, 9 fig.
- _____. and _____. 1938. The Pleistocene vertebrate fauna from Cumberland Cave, Maryland. *Bull.* 171, U. S. Nat. Mus., vi-100, 10 pl. 50 fig.
- Gilmore, Charles W., 1921. The fauna of the Arundel formation of Maryland. *Proc. U. S. Nat. Mus.*, 59:581-594, 5 pl.
- Glades Star, 1941. Who discovered Garrett County? *Garrett Co. Hist. Soc.*, (1):1-3.
- _____. 1943. [Naming of Buffalo Run, Garrett County]. *Garrett Co., Hist. Soc.*, (11).

1945. Teen Friend, wandering pioneer. Garrett Co. Hist. Soc., 157-164.
1947. Nemacolin's path thru Garrett County, Maryland. Garrett Co. Hist. Soc., (25).
1947. The Ashbys of Great Glades settlement. The last buffaloes. Garrett Co. Hist. Soc., (28):269.
- Goldman, Edward A., 1910. Revision of the wood rats of the genus *Neotoma*. N. Amer. Fauna. (31):1-124, 8 pl. 14 fig.
1918. The rice rats of North America (genus *Oryzomys*). N. Amer. Fauna. (43):1-100, 6 pl., 11 fig.
1937. The wolves of North America. Journ. Mamm. 18:37-45.
- _____ and H. H. T. Jackson, 1939. Natural History of Plummers Island, Maryland. IX. Mammals. Proc. Biol. Soc. Wash., 52:131-134.
- Goodwin, George Gilbert, 1935. The mammals of Connecticut. State. Geol. and Nat. Hist. Surv. Bull. 53, 1-221, 33 pl., 19 fig.
- Guthelm, Frederick, 1949. The Potomac. Rinehart & Co., N. Y. 1-436.
- Hall, Clayton Colman, (editor). 1910. Narratives of early Maryland, 1633-1684. Scribner's Sons, N. Y., ix-460, map.
- Haller, K., 1939. Three new mammal records from the northern panhandle of West Virginia. Proc. W. Va. Acad. Sci., 12:67-68.
- Hamilton, William J., Jr. 1943. The mammals of Eastern United States. Comstock Pub. Co., Ithaca, 1-432, 184 fig.
- Hampe, Irving E., 1935. Notes on the white-footed mice. Bull. Nat. Hist. Soc. Md., 5(10):63-64.
- _____ 1936. The occurrence and breeding of the Maryland shrew in the Patapsco State Park. Bull. Nat. Hist. Soc. Md., 7(4):17-18, 2 fig.
- _____ 1938. Maryland nature log. II. The squirrels of Maryland. Bull. Nat. Hist. Soc. Md., 9(3):26-27.
- _____ 1939. Notes on the mammals of the Patapsco State Park. Md. Conserv. Repr. from Bull. Nat. Hist. Soc. Md., 16(4):27-28.
- _____ 1941. New mammal records for Loch Raven. Bull. Nat. Hist. Soc. Md., 11(3):57.
- _____ 1943. Mammal note. Bull. Nat. Hist. Soc. Md., 13(4):66.
- _____ 1944. An unusual color phase of the short-tailed shrew. Md., Journ. Nat. Hist. Soc. Md., 14(3):73.
- _____ 1948. Sources of mammalian study material. Md. Nat., 18(3):50.
- Handley, C. O., Jr. 1948. Habitat of the golden mouse in Virginia. Journ. Mamm. 29(3):298-299.
- _____ and Clyde P. Patton, 1947. Wild mammals of Virginia. Comm. of Game & Inland Fisheries, Richmond, 1-220, 103 fig.
- Harper, Francis, 1945. Extinct and vanishing mammals of the old world. Amer. Committee for International Wildlife Protection. 1-850, 67 fig.
- Hay, O. P., 1906. Pliocene and Pleistocene report. Maryland Geological Survey, Johns Hopkins University.
- _____ 1908. The fossil turtles of North America. Pub. Carnegie Inst. Wash. (75):iv-568, 113 pl.
- _____ 1920. Descriptions of some Pleistocene vertebrates found in the United States. Proc. U. S. Nat. Mus., 58:83-146, 9 pl. 4 fig.
- _____ 1923. The Pleistocene of North America and its vertebrate animals from the States east of the Mississippi River and from the Canadian provinces East of Longitude 95°. Pub. Carnegie Inst. Wash. (322):viii-499, 25 fig., 41 maps.
- Hayden, F. Stansbury, 1931. Some observations on the Canadian beaver. Bull. Nat. Hist. Soc. Md., 2(1):49-51.
- Heit, W. S., 1944. Food habits of red foxes of the Maryland marshes. Journ. Mamm. 25:55-58.
- Helm, Oscar L., 1939. Preliminary report on fossil whale mandibles. Bull. Nat. Hist. Soc. Md., 9(12):107-110.
- Hollister, Ned, 1911. Remarks on the long-tailed shrews of the Eastern United States, with descriptions of a new species. Proc. U. S. Nat. Mus. 40:377-381.
- _____ 1911. A systematic synopsis of the muskrats. N. Amer. Fauna. (32):1-47, 6 pl.
- Hooper, Emmet T., 1942. The water shrew (*Sorex palustris*) of the Southern Allegheny Mountains. Occ. Pap., Mus. Zool., Univ. Mich. (463):1-4.
- _____ 1943. Geographic variation in harvest mice of the species *Reithrodontomys humilis*. Occ. Pap., Mus. Zool., Univ. Mich., (477):1-19, 1 map.
- Hornaday, William T., 1889. The extermination of the American bison, with a sketch of its discovery and life history. Ann. Rept. U. S. Nat. Mus. for 1887, 367-548, 21 pl. map.
- Howell, A. Brazier, 1927. Revision of the American lemming mice (genus *Synaptomys*). N. Amer. Fauna. (50):1-37, 2 pl. 11 fig.
- _____ 1930. At the cross-roads. Journ. Mamm. 11:377-389.
- Howell, Arthur H., 1901. Revision of the skunks of the genus *Chincha* (*Mephitis*). N. Amer. Fauna, (20):1-62, 8 pl.
- _____ 1906. Revision of the skunks of the genus *Spilogale*. N. Amer. Fauna, (26):1-55, 10 pl. 1 map.
- _____ 1909. Notes on the distribution of certain mammals in the southeastern United States. Proc. Biol. Soc. Wash., 22:55-68.
- _____ 1911. Capture of *Sorex dispar* in West Virginia. Proc. Biol. Soc. Wash., 24:98-99.
- _____ 1914. Revision of the American harvest mice (genus *Reithrodontomys*). N. Amer. Fauna, (36):1-97, 7 pl., 6 fig.
- _____ 1915. Revision of the American marmots. N. Amer. Fauna, (37):1-80, 15 pl., 3 fig.
- _____ 1918. Revision of American flying squirrels. N. Amer. Fauna, (44):1-64, 7 pl., 4 fig.
- _____ 1929. Revision of the American chipmunks (genera *Tamias* and *Eutamias*). N. Amer. Fauna, (52):1-157, 10 pl., 9 fig.
- Hoye, Charles E., 1942. The Friend family of Garrett County, Maryland. Glades Star, Garrett Co. Hist. Soc., (7):53-55.
- _____ 1946. The McHenry's at Buffalo Marsh. Glades Star, Garrett Co. Hist. Soc. (23):185-200.
- Jackson, Hartley H. T., 1915. A review of the American moles. N. Amer. Fauna, (38):11-100, 6 pl., 27 fig.
- Jackson, Hartley H. T., 1922. A coyote in Maryland. Journ. Mamm. 3:186-187.
- _____ 1928. A taxonomic review of the American long-tailed shrews (genera *Sorex* and *Microsorex*). N. Amer. Fauna, (51):1-238, 13 pl., 24 fig.
- Jones, Hugh, 1705. An account of Maryland. Philos. Soc. Trans. Colls. 3(2):600-603.
- Jordan, David Starr, 1929. Manual of the vertebrate animals of the Northeastern States, exclusive of the marine species. 13th Edition. World Book Co., N. Y., 1-446., 111.
- Kellogg, Remington, 1923. Description of two squalodonts recently discovered in the Calvert Cliffs, Maryland; and notes on the shark-toothed cetaceans. Proc. U. S. Nat. Mus., 62:1-69, 20 pl.
- _____ 1924. A fossil porpoise from the Calvert formations of Maryland. Proc. U. S. Nat. Mus., 63:1-39, 18 pl.
- _____ 1924. Descriptions of a new genus and species of whalebone whale from the Calvert Cliffs, Maryland. Proc. U. S. Nat. Mus., 63:1-14, 6 pl.
- _____ 1927. *Kentriodon pernix*, a Miocene porpoise from Maryland. Proc. U. S. Nat. Mus., 69:1-55, 14 pl., 20 fig.
- _____ 1937. Annotated list of West Virginia mammals. Proc. U. S. Nat. Mus. 84:443-479.
- _____ 1939. Annotated list of Tennessee mammals. Proc. U. S. Nat. Mus., 86:245-303.
- _____ 1940. Whales, giants of the sea. Natl. Geog. Mag., 77(1):35-90, 24 pl., 25 fig.
- Klingel, Gilbert C., 1939. Maryland today the result of an ancient yesterday. Md. Conserv. [Repr. from Bull. Nat. Hist. Soc. Md.], 16:13-15.
- Kolb, C. Haven, Jr., 1938. Observations in the vicinity of Loch Raven. III. Mammals. Bull. Nat. Hist. Soc. Md., 9(1):1-5.
- _____ 1939. Loch Raven deer. Bull. Nat. Hist. Soc. Md., 10(2):21.
- _____ 1940. Observations in the vicinity of Loch Raven. IV. Further mammal notes. Bull. Nat. Hist. Soc. Md., 11(1):12-15.
- _____ 1944. Little known neighbors. Md., Journ. Nat. Hist. Soc. Md., 14(4):93-96. 3 fig.
- _____ 1948. Robin and bat. Md. Nat., 18(3):50-51.
- Latrobe, Ferdinand C. 1934. The sperm whale returns. The Sunday Sun, July 22, 1934.
- LeCompte, E. Lee., 1925-29-30. Revised edition of the muskrat industry in Maryland. Conserv. Dept. of Md., 1-47, 16 fig.
- LeCompte, E. Lee., 1937. Otter caught in gill net. Md. Conserv., 14(3):15.

1942. Bushy tail. Md. Conserv., 19:8-9.
- Llewellyn, Leonard M., 1943. A determination of the species and subspecies of the rabbits of the genus *Sylvilagus* and their distribution in Virginia. Unpub. thesis (VPI), 1-47, 15 fig., 7 tab., frontis.
- _____ and C. O. Handley, 1945. The cottontail rabbits of Virginia. Journ. Mamm., 26(4):379-390. 2 maps, 1 table.
- Llewellyn, Leonard M., 1950. Reduction of mortality in live-trapping mice. Journ. Wildlife Management. 14(1): 84-85.
- Lucas, Frederick A., 1889. Animals recently extinct or threatened with extermination as represented in the collections of the U. S. National Museum. Rept. U. S. Nat. Mus. for 1889. Pt. 3, No. 1, 609-649, 2 fig., 7 maps. 10 pl.
- _____ 1906. Palaeontology of the Pleistocene deposits of Maryland. Mammalia, Md. Geol. Surv., 157-169, xxxv-xl pl.
- _____ 1906. The elephants of the Pleistocene, Maryland Geological Survey, Pliocene and Pleistocene, Baltimore. 149-152. 11l.
- Lugger, Otto, 1881. The occurrence of the Canadian porcupines in Maryland. Proc. U. S. Nat. Mus., 4:161-162.
- Luttringer, Leo A., Jr. 1931. An introduction to the mammals of Pennsylvania. Bull. 15, Penna. Brd. Game Comm.
- Lynn, W. G., 1943. The nature history of the bat. Bull. Nat. Hist. Soc. Md., 13:72-75.
- Lyon, Marcus Ward, Jr., 1903. Observations on the number of young of the lasiurine bats. Proc. U. S. Nat. Mus., 26:425.
- Mansueti, Romeo, 1938. The mammals noted during 1938 in and around the Patapsco State Park, Maryland. Jr. Bull. Nat. Hist. Soc. Md., 3(4):48-53, 8 fig.
- _____ 1941. Trouessart's little brown bat around Baltimore. Sr. Bull. Nat. Hist. Soc. Md., 11(3):96-97, 1 fig.
- _____ 1946. Meet the Maryland mammals. Baltimore Evening Sun. 20 numbers. May 13, daily through June 7, 1946. [Cont. in Md. Conserv., 1949], 11l.
- _____ 1947. North America's smallest mammal. Nat. Mag., 40(10):79-80, 1 fig.
- _____ 1948. Winter expedition in Maryland. Md. Nat., 18(1):3-9, 3 fig.
- _____ 1949. Meet your Maryland mammals. Md. Conserv. 26(1 & 2).
- Marye, William B., 1945. Some extinct wild animals of Tidewater. Maryland Tidewater News. 2(1):1-3.
- Maryland Academy of Science and Literature. 1836. Transactions. Md. Acad. Sci. & Lit., 1:167.
- Maryland Conservationist. 1926. Seals in the Chesapeake Bay. Md. Conserv. 3(2):11.
- _____ 1928. Dam made by beavers found near Hagerstown. Md. Conserv. 5(1):3.
- _____ 1928. Negro Mountain deer draw wildcats, report. Md. Conserv. 5(1):19.
- _____ 1929. White-tailed deer on increase in Maryland. Md. Conserv. 6(4):26.
- _____ 1930. First fox-hunting in America took place in Queen Anne's. Md. Conserv., 7(2):25.
- _____ 1930. Farm-hand catches his own sealskin coat in Bay. Md. Conserv. 7(4):21.
- _____ 1930. Seal killed years ago at Cambridge, Md. Conserv., 7(4):21.
- _____ 1931. A bear hunt in Western Maryland. Md. Conserv. 8(2):12.
- _____ 1931. Wild deer appear in Somerset County. Md. Conserv., 8(3):28.
- _____ 1932. Virginia white-tailed deer increasing in Maryland. Md. Conserv. 9(1):13.
- _____ 1932. A monster [leather-back turtle] of the tropical seas captured in Maryland waters. Md. Conserv. 9(3):21-22, 2 fig.
- _____ 1934. Beaver captured near Flintstone, Allegany Co. Md. Conserv. 11(2):21.
- _____ 1935. Deer killed in Worcester County. Md. Conserv. 12(1):28.
- _____ 1937. Wild dog pack adds young buck to long list of victims. Md. Conserv., 14(2):11, 1 fig.
- _____ 1937. Dawson takes first marlin [marlin and porpoise "battle" off Ocean City] : Md. Conserv., 14(3):15.
- _____ 1937. Hunts ghost, finds opossum and young. Md. Conserv., 14(4):4.
- Maryland State Planning Commission, 1947. Manual of coordinates for places in Maryland. State of Maryland, Baltimore, 1-151, September, 1947.
- McAtsee, Waldo L., 1918. A sketch of the natural history of the District of Columbia... Bull. Biol. Soc. Wash., (1): 1-142, 5 maps.
- McCauley, Robert H., Jr. 1945. The reptiles of Maryland and the District of Columbia. Pub. by author. Hagerstown, 1-194, 94 fig.
- McColgan, Edward, 1940. Backyard mammals. Bull. Nat. Hist. Soc. Md., 11(2):38.
- Mearns, Edgar A., 1911. Description of a new rabbit from Islands off the coast of Virginia. Proc. U. S. Nat. Mus., 39:227.
- Mearns, Louis Z., 1897. On the occurrence of the genus *Reithrodontomys* in Virginia. Amer. Nat., 31:160-161.
- Merriam, C. Hart, 1895. Revision of the shrews of the American genera *Blarina* and *Notiosorex*. N. Amer. Fauna (10): 1-34, 3 pl. 2 fig.
- _____ 1896. Revision of the lemmings of the genus *Synaptomys*, with descriptions of new species. Proc. Biol. Soc. Wash., 10:55-64.
- _____ 1900. The life zones and areas of Allegany County. Maryland Geol. Surv., Allegany County, 291-293.
- Miller, Gerrit S., Jr. 1897. Revision of the North American bats of the family *Vesperilionidae*. N. Amer. Fauna (13): 1-140, 3 pl., 40 fig.
- _____ 1900. Key to the land mammals of northeastern North America. Bull. N. Y. State Mus., 8(38).
- _____ 1920. American records of whales of the genus *Pseudorca*. Proc. U. S. Nat. Mus. 40:111-112.
- _____ 1924. List of North American recent mammals, 1923. U. S. Nat. Mus., Bull. 128, xvi-673.
- _____ 1927. A Pollack whale on the coast of Virginia. Proc. Biol. Soc. Wash., 40:111-112.
- _____ and Glover M. Allen, 1928. The American bats of the Genera *Myotis* and *Pizonyx*. Bull. U. S. Nat. Mus. No. 144, viii-218, 1 pl. 1 fig. 13 maps.
- Minke, Joseph A., 1946. Western Maryland deer. Md. Conserv., 23(3):4, 1 fig.
- Mohr, Charles E., 1931. Preliminary report on the mammals of Pennsylvania. Proc. Penna. Acad. Sci., 5:17-27.
- _____ 1932. The seasonal distribution of bats in Pennsylvania. Proc. Penna. Acad. Sci., 4.
- _____ 1932. *Myotis subulatus leibii* and *Myotis sodalis* in Pennsylvania. Journ. Mamm. 13:160-161.
- _____ 1933. Marking bats for later recognition. Proc. Penna. Acad. Sci., 8:26-36.
- _____ 1942. Bat tagging in Pennsylvania turnpike tunnels. Journ. Mamm. 23:375-379.
- _____ 1942. Results of ten years' bat marking in Pennsylvania. Proc. Penna. Acad. Sci., 16:32-36.
- Moorefield, Herbert H. 1939. The mammal nest beetles (*Coleoptera*, Family *Leptinidae*). Bull. Nat. Hist. Soc. Md., 10(2):12-14, 2 fig.
- Morao, M. Figanierre E., 1869. An account of a remarkable accumulation of bats. Smithsonian Rept. for 1869.
- Muma, Martin H., 1946. Notes on several Maryland caves. Md., Journ. Nat. Hist. Soc. Md., 16(2):27-32.
- Nelson, Edward W., 1909. The rabbits of North America. N. Amer. Fauna. (29):1-314, 13 pl., 19 fig.
- _____ 1913. A new bat from the Eastern United States. Washington, D. C. Proc. Zool. Soc., 26:183-184.
- _____ 1916. The larger North American mammals. Natl. Geog. Mag., 30:385-472, profusely ill.
- _____ 1918. Smaller mammals of North America. Natl. Geog. Mag., 33:371-493, profusely ill.
- _____ 1930. Wild animals of North America. Intimate studies of big and little creatures of the mammal kingdom. Natl. Geog. Soc., 1-254, profusely ill. with col. drawings and photographs.
- Olser, T. Milton, Jr., 1937. The *Proboscidea* of Maryland. Bull. Nat. Hist. Soc. Md., 8(1):1-5, 3 fig.
- Osgood, Wilfred H., 1909. Revision of the mice of the American genus *Peromyscus*. N. Amer. Fauna. (28):1-285, 8 pl. 12 fig.
- Patterson, Bryan, 1932. Upper molars of *Canis ambrusteri* Gidley from Cumberland Cave, Maryland. Amer. Journ. Sci., 23:334-336, 1 fig.

- Patton, Clyde P., 1938. Distributional list of the mammals of Virginia. Unpublished thesis (VPI), 1-114; 1 fig.
- _____. 1939. Distribution notes on certain Virginia mammals. *Journ. Mamm.* 20(1):75-77.
- Peabody, Charles, 1908. [Explorations of Bushey Cavern, near Cavetown, Maryland.]. *Bull.* 4, *Archaeol. Phillips Acad.*, 1-2.
- Pearson, Oliver P., 1945. Longevity of the short-tailed shrew. *Amer. Midl. Nat.*, 34:531-546
- _____. 1946. Scent glands of the short-tailed shrew. *Anat. Rec.* 94:615-630, 2 pl.
- _____. and Anita K. Pearson, 1947. Owl predation in Pennsylvania, with notes on the small mammals of Delaware County. *Journ. Mamm.* 28:137-147.
- Peaseley, William [Author?], 1635. A relation of Maryland. In Hall, Clayton Colman. *Narratives of early Maryland.* 1910, N. Y., 64-112.
- Petrides, George A., Jr. 1943. Mammals of the National Capital Parks and the District of Columbia region. *Natl. Cap. Pk., Nat. Pk. Serv., Dept. Interior.* 1-4.
- Philp, James, 1861. Philp's Washington described. A complete view of the American capital, and the District of Columbia, and ... scientific [notices]. Ed. by W. D. Hale, N. Y., Rudd & Carleton. 1-239.
- Poole, Arthur J. & Viola S. Schantz, 1942. Catalog of the type specimens of mammals in the U. S. National Museum, including the Biological Survey's collection. *Bull. U. S. Nat. Mus.* 178: 1-718.
- Poole, Earl L., 1932. A survey of the mammals of Berks County, Pennsylvania. Reading Pub. Mus. & Art Gallery. *Bull.* 13, 1-74, 111.
- _____. 1937. Pennsylvania records of *Sorex cinereus fontinalis*. *Journ. Mamm.* 18(1):96.
- _____. 1940. A life history sketch of the Allegheny woodrat. *Journ. Mamm.* 21(3):249-270, 3 pl.
- _____. 1940. The technical name of the Allegheny woodrat. *Journ. Mamm.* 21(3):316-318.
- _____. 1943. *Synaptomys cooperi stonei* from the Eastern Shore of Maryland. *Journ. Mamm.* 24(1):103.
- _____. 1944. The technical names of the Northeastern fox squirrels. *Journ. Mamm.* 25(3):315-317.
- _____. 1949. A new race of red-backed mouse (*Clethrionomys*) from Pennsylvania. *Notulae Naturae* (212):1-4.
- Porter, Roland, 1939. Beavers in Maryland. *Md. Conserv.*, 16(2):10-11, 3 fig.
- Preble, Edward A., 1899. Revision of the jumping mice of the genus *Zapus*. *N. Amer. Fauna.* (15):1-42, 1 pl. 4 fig.
- _____. 1910. A new *Microsorex* from the vicinity of Washington, D. C. *Proc. Biol. Soc. Wash.*, 23:101-102.
- Purchas, Samuel, 1625. A letter of Sir Samuel Argoll tending his voyage to Virginia and actions there: written to Master Nicholas Hawes. June, 1613. In *his Pilgrimes*. London, Henry Fetherstone, 1625. Vol. 4, 1764-1765 pp.
- Raney, M. Llewellyn, 1916. Maryland's stock of wild life. Its value, depletion and means of recovery. *Md. Wildlife Protective Assn. Bull.* 1, Baltimore. 1-15.
- Rhoads, Samuel N., 1898. A contribution to a revision of the North America beavers, otters and fishers. *Trans. Amer. Philos. Soc.*, Ser. 2, 19:417-439, 5 pl.
- _____. 1898. [Fossil Atlantic walrus described]. *Proc. Acad. Nat. Sci. Phila.*, 201.
- _____. 1903. The mammals of Pennsylvania and New Jersey: a biographic, historic and descriptive account of the furred animals of land and sea, both living and extinct, known to have existed in these states. Philadelphia, 1-266, 9 pl., map.
- Scharf, J. Thomas, 1879. History of Maryland. John B. Piet, Publishers. Baltimore. 3 vol.
- _____. 1882. History of Western Maryland. Being a history of Frederick, Montgomery, Carroll, Washington, Allegany, and Garrett Counties from the earliest period to the present day... Philadelphia, 2 Vol., 1:18 and 76.
- Schenk, Edward T. & John H. McMasters, 1948. Procedure in taxonomy. Stanford University Press, Stanford vii-193.
- Schorger, A. William, 1944. The validity of *Bison bison pennsylvanicus*. *Journ. Mamm.* 25(3):313-315.
- Schuchert, Charles, 1903. On the Lower Devonian and Ontario formations of Maryland. *Proc. U. S. Nat. Mus.*, 26:413-424.
- Schwarz, Ernest & Henriette K. Schwarz, 1943. The wild and commensal stocks of the house mouse, *Mus musculus* Linnaeus. *Journ. Mamm.* 24(1):59-72
- Seibert, Henri, 1939. Weasel. *Bull. Nat. Hist. Soc. Md.*, 10(2):21.
- Seton, Ernest Thompson, 1929. Lives of game animals: An account of land animals ... north of the Mexican border. Garden City, N. Y. 4 vol. ill.
- Shoemaker, Henry W., 1913. Stories of great Pennsylvania hunters. Altoona, 1-53.
- _____. 1914a. Wolf days in Pennsylvania. Altoona, 1-83.
- _____. 1914b. The Pennsylvania lion or panther. Altoona, 1-47, 111.
- _____. 1915a. Pennsylvania deer and their horns. Reading, 1-120, 111.
- _____. 1915b. A Pennsylvania bison hunt. Middleburg, 1-60, 111.
- _____. 1916. Pennsylvania wild cats. Altoona, 1-34, 111.
- _____. 1917a. The black moose of Pennsylvania. Altoona, 111.
- _____. 1917b. Stories of Pennsylvania animals. Altoona, 1-31, 111.
- _____. 1922. *Felis catus* in Pennsylvania? Altoona, 1-20, 111.
- Simpson, George Gaylord, 1945. The principles of classification and a classification of mammals. *Bull. Amer. Mus. Nat. Hist.* 85:1-350.
- Sines, A. L., 1945. Bear hunt. Glades Star, Garrett Co. *Hist. Soc.* (19):154.
- Smith, Frank Rush, 1934. Life history and habits of the muskrat. *Md. Conserv.* 11(4):1-4, 21-26.
- _____. 1938. Muskrat investigations in Dorchester County, Maryland, 1930-34. U. S. D. A. Circular (174):1-24, 111.
- Smith, H. W., 1878. A sporting family of the Old South, N.Y. Smith, John, 1607-8. The proceedings and accidents of the English colony in Virginia ... the Third Booke. In Arber, Edward. Captain John Smith, president of Virginia, and Admiral of New England, Works. 1608-1631. Birmingham Bros., 1884. cxxxvi-984.
- Stearns, Richard E., 1940. The Hughes site. An aboriginal village site on the Potomac River in Montgomery County, Maryland. *Proc. Nat. Hist. Soc. Md.* #6, 1-15, 5 pl. 17 fig.
- _____. 1943. Some Indian village sites of tidewater Maryland. *Proc. Nat. Hist. Soc. Md.* #9, 1-31, 18 pl. 57 fig.
- Stickel, Lucille, 1949. An experiment on *Peromyscus homing*. *Amer. Midland Nat.* 41(3):649-664.
- Stickel, W. H. & J. B. Cope, 1947. The home ranges and wanderings of snakes. *Copeia*, (2):127-136.
- Stone, Witmer, 1908. The mammals of New Jersey. *Ann. Rept. New Jersey State Mus. for 1907.*, 33-110.
- _____. and William E. Cram, 1902. American animals. A popular guide to the mammals of North America north of Mexico, with intimate biographies of the more familiar species. xxiii-318, 111. N. Y.
- Stuart, E. T., Jr., 1926. Mammals of Delaware County, Pennsylvania, and adjacent counties. A resume. *The Oologist.* 43:130-136.
- Todd, Charles Burr, 1889. Story of Washington, N. Y. 18.
- Tomkins, Ivan R., 1931. Some late records of the timber wolf in Pennsylvania. *Journ. Mamm.* 12:165.
- Towers, Irving L., 1944. Notes on mammal sperms. *Md., Journ. Nat. Hist. Soc. Md.*, 14(4):83-90, 7 fig.
- True, Frederick R., 1889. Contributions to the natural history of the cetaceans, a review of the family *Delphinidae*. *Bull. U. S. Nat. Mus.* 36, 1-191, 47 pl.
- _____. 1890. Observations on the life history of the bottlenose porpoise. *Proc. U. S. Nat. Mus.* 13:197-203, 1 fig.
- _____. 1892. The puma or American lion (*Felis concolor* of Linnaeus). *Rept. Nat. Mus.* 1888-89. 591-608, pl. 94.
- _____. 1906. Description of a new genus and species of fossil seal from the Miocene of Maryland. *Proc. U. S. Nat. Mus.* 30:835-840. 2 pl.
- _____. 1908. On the occurrence of remains of fossil cetaceans of the genus *Schizodelphis* in the United States, and on *Priscodelphinus* (?) *crassangulum* Case. *Smithsonian Misc. Coll.* (Quart. Issue). 50:449-460. 2 pl.
- _____. 1908. Remarks on the fossil cetacean *Rhabdosteus latiradix* Cope. *Proc. Acad. Nat. Sci. Phila.* 60:24-29, 1 pl. 1 fig.
- _____. 1911. Description of a fossil delphinoid cetacean, with tuberculate teeth. *Proc. Biol. Soc. Wash.*, 24:37-38.
- Truitt, Reginald V. 1939. Our water resources and their conservation. *Md. Conserv.* 27, Chesapeake Biol. Lab., 1-103, 111.

_____. 1946. Bounty on bears. Md. Tidewater News. 3(5):4.
 _____. 1947. Three bears. Md. Tidewater News. 3(8):3.
 Tyrrell, W. B., 1936. Photographs of porcupine in "Wild Life of Maryland." The Sunday Sun, Rotogravure section, October 18, 1936.
 Uhler, Philip R., 1888. Sketch of the history of the Maryland Academy of Sciences. Trans. Md. Acad. Sci., 1:1-10.
 Ulmer, F. A., 1944. Further notes on the rice rat in Delaware. Journ. Mamm. 25:411.
 Vokes, H. E., 1949. Maryland dinosaurs. Md. Nat. 19(3):38-46, 3 fig.
 Walker, Earnest P., 1950. Bats are my best friends. Sat. Eve. Post, 222-25-26, 3 fig.
 Warden, David Baillie, 1820. Description statistique, historique et politique des Etats-Unis de L'Amerique Septentrionale ... Paris, Chez et Gravier, 1820. 5 Vol.
 Wetmore, Alexander, 1923. The wood rat in Maryland. Journ. Mamm. 4:187-188.
 White, Father Andrew, 1632. A relation of the colony of the Lord Baron of Baltimore, in Maryland, near Virginia, etc. Forces Coll. Hist. Tracts, 4(12):6 & 7.

Williams, Samuel Howard, 1930. The mammals of Pennsylvania. Privately printed, Pittsburgh, 2nd ed. 1-159.
 _____. 1930b. Mammalian fauna of Pennsylvania. Ann. Carnegie Mus., 19:225-234.
 _____. 1930c. The distribution of foxes in Pennsylvania. Jour. Mamm. 11:313-314.
 Wilson, Kenneth A., 1946. Wild turkey and other upland game survey and a management study: Annual report for 1945. Md. Conserv. 23(3):8-13, 23.
 Wilson, L. W., 1946. Notes on bats from Eastern West Virginia. Journ. Mamm. 27:85-86.
 _____. and J. E. Friedel, 1942. A list of the mammals collected in West Virginia. Proc. W. Va. Acad. Sci., 15:85-92.
 Young, Stanley P., 1946. Sketches of American wildlife. Baltimore. 1-165, 50 ill.
 _____. 1946. The wolf in North America. Caldwell, Ida., 1-149, 53 ill.
 _____. and Edward A. Goldman, 1944. The wolves of North America. Amer. Wildlife Inst., Wash., xx-636, 131 pl. 15 fig., 7 tables.
 _____. and _____. 1946. The puma, mysterious American cat. Ibid., 1-372, 118 ill., 13 tables.



The American bison inhabited the "glades" of Western Maryland, where they were recorded as late as 1774 in the meadowlike areas in the mountains. Large herds of bison came up from the lowlands to graze on the rich glade grass in summer.

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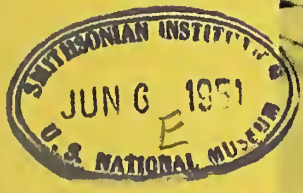
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Yellow-breasted
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The Natural History Society of Maryland

VOLUME XX

No. 3 1950



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MARYLAND NATURALIST



All are but parts of one stupendous whole,
Whose body nature is, and God the soul;
That changed thro' all, and yet in all the same,
Great in the earth as in th' aethereal frame,
Warms in the sun, refreshes in the breeze,
Glow in the stars, and the blossoms in the trees,
Lives thro' all life, extends thro' all extent,
Spreads undivided, operates unspent;
Breathes in our soul, informs our mortal part,
As full, as perfect, in a hair as heart;
As full, as perfect, in vile man that mourns,
As the rapt Seraph that adores and burns.
To him no high, no low, no great, no small.
He fills, he bounds, connects, and equals all!

Essay on Man. Epistle I
Alexander Pope



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VOLUME XX No. 3
1950

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Wild Azalea

Rhododendron nudiflorum

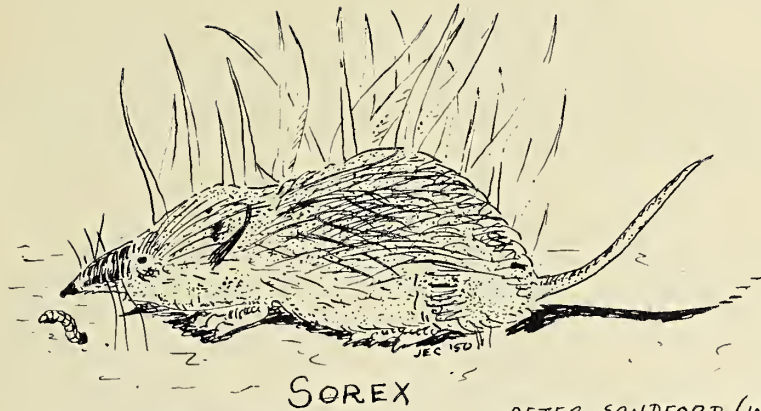
Photographed By

Earl H. Palmer

MARYLAND MOLES AND SHREWS

by

JOHN E. COOPER



Sorex

AFTER SANDFORD (IN PART)

Maryland moles and shrews belong to that large group of animals known as mammals - animals characterized by their covering of hair or fur, their practically constant body temperature and the fact that they nurse their young after birth by means of milk-producing glands called mammaries.

The moles and the shrews are the only two families of the *Insectivora* (insect devourers) in North America. They are alike in that both have five clawed toes on each foot, small ears which are not readily visible, tiny hidden eyes of very little use, a long, somewhat elastic snout, and scent glands in most species which give off a strong, disagreeable odor.



Forefoot of Mole

Moles are very well adapted for subterranean life, with their highly specialized forelimbs and large, broad forefeet with heavy nails suited for digging. Other typical characteristics are their soft fur which, when stroked, will lie in any direction, and the short, nearly naked tail (excepting Brewer's mole), a sensitive organ which guides the animal when it moves backward in its tunnel.

In areas where moles are found, their presence is indicated by long, raised ridges of earth in fields, pastures, meadows, and thin woods. Often these ridges appear on golf greens and lawns, which they disfigure. These ridges are actually the upper parts of tunnels, the digging of which aids in the formation of soil. Field mice (*Microtus*) and pine mice (*Pitymys*) sometimes use mole tunnels as highways and in the course of their traveling they eat the exposed roots of grasses and plants, an action which is usually blamed on the moles.



Parascalops



AFTER SHIELDS

Scalopus

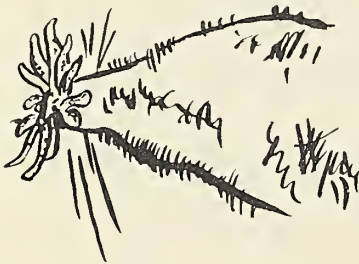
Moles are known to eat plant matter but they probably could not live for long on vegetation only. They feed chiefly on insects and worms and their food is of slight economic importance. When tunneling, they literally swim through the soil with breast stroke-like actions of the forelimbs.

The common mole, *Scalopus a. aquaticus*, occurs throughout central and southern Maryland and the eastern shore. It prefers loose soil containing little moisture. During the winter the pelage of this species varies in coloration from fuscous to black on the dorsal surface, becoming paler in summer. The underparts are usually grayish.

From two to five young are born in early March or April, in a nest of leaves and grass usually located beneath a group of boulders, a stump, or a bush. Although blind and naked at birth, they acquire soft, gray fur in ten days, and at the end of four weeks are able to shift for themselves. The major food item of the common mole is earthworms, but insects and insect larvae are other prominent items on its menu. Owing to its underground existence, the mole has few enemies, but is preyed upon by certain snakes, mammals, and predatory birds. In the course of its life it seldom wanders far from its tunnel.

Unlike the common mole, which has a nearly naked tail, Brewer's mole, *Parascalops breweri*, has a hairy tail which has earned it the more familiar name of "hairy-tailed" mole. Otherwise, it is similar to the common mole, not only in appearance and feeding habits but also in the selection of well-drained, loose soil for its tunneling. However, it often wanders from its tunnels at night to search for prey on the forest floor, something which *Scalopus* rarely does. Brewer's mole is found in pasture lands, lightly wooded areas, and even in well-wooded forests supporting hemlock, birch, and pine.

Mating takes place in late March or early April and the young, usually four or five in number, are born in late April or May. In Maryland, Brewer's mole is known only from Garrett County.



Condylura

after Shields



Scalopus

The unusual star-nosed mole, *Condylura cristata*, may be distinguished from any other mammal in the world by the twenty-two fleshy-pink projections or rays which surround the tip of the snout, giving the creature its common name. In addition to this outstanding characteristic, the mole has a long, scaly, scantily-haired tail, and dark, nearly black fur which is paler on the sides and belly. It is

found in damp regions such as meadows, swamps, fields, and moist woods and is as much at home in water as on land, being a very capable swimmer. When swimming or digging, the nose tentacles are brought together to close the external openings of the nostrils. In keeping with its aquatic habits, much of the mole's food consists of crustaceans, leeches, water insects, and occasionally small minnows,

all of which are secured on stream or pond bottoms. In one instance, four-fifths of the food of the star-nosed mole, studied near Ithaca, New York, was of aquatic origin. For such items the mole sometimes has to root in mud. Specimens have been caught in minnow traps in eighteen inches of water.

Condylura is active throughout the year, sometimes burrowing directly in snow, or appearing on it, during the winter. It has even been observed swimming under ice. Since it is active during the day as well as at night the list of enemies of the star-nosed mole includes hawks, predatory mammals, snakes, owls, and possibly such fish as bass and pike.

Its tiny eyes are capable only of distinguishing light from darkness. To compensate for this lack of one sense, it has acute hearing and remarkably well developed touch. Theoretically, it is distributed in suitable areas throughout the state of Maryland, but specimens to prove its presence are few.

The shrews are a group of small, mouse-like creatures among which are some of the tiniest known mammals in the world. They are seldom collected alive and even when captured without injury rarely live for more than a day or two in captivity. An insatiable appetite and naturally nervous manner make the shrews veritable sparkplugs of activity.

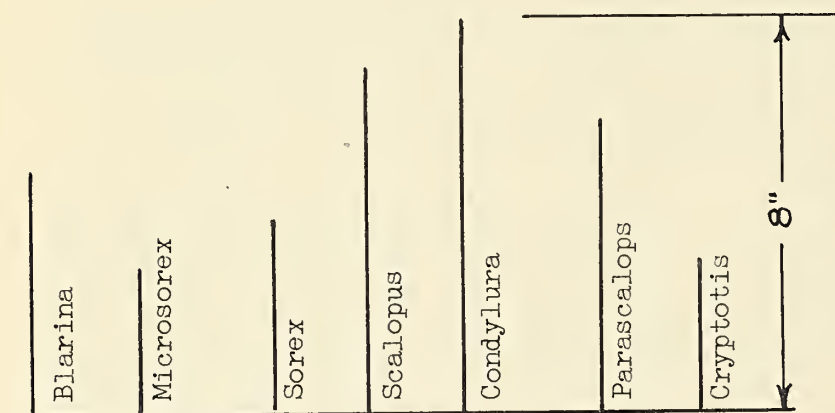
The largest of our native Maryland shrews is the short-tailed shrew, *Blarina brevicauda*, a bob-tailed, slate-colored shrew with short legs, minute eyes, and concealed ears. On the sides of the animal, near the flanks, are a pair of scent glands. These glands produce a penetrating odor which is especially vile during the breeding season, notably in the males. The menu of the short-tailed shrew contains insects, spiders, centipedes, snails, slugs, berries, fruits, beechnuts, roots, and occasionally mice and salamanders. It is found in a great many habitats, from the salt marshes of the flat Coastal Plain of the Eastern Shore and southern Maryland, to the timbered regions in the mountains of western Maryland. Usually it is most abundant in damp woods with thick leaf mold, but it is not uncommon in overgrown fields and meadows. The young, usually five to nine, are born between early Spring and late Fall. Weasels, skunks, snakes, owls, and hawks are among the enemies of *Blarina*.

A pint-sized edition of the common short-tailed shrew is the least shrew, *Cryptotis parva*. This small animal has earned the name "bee shrew" through its habit of entering bee hives, building its nest there, and feeding on the adult bees and larvae. Small insects, spiders, earthworms, mollusks, and the dead bodies of other small mammals are all eaten by the least shrew. *Cryptotis* makes its home in marshes, in dry fields, and in damp wooded areas where the nests of the creature are sometimes found inhabited by more than one individual. This is unique among shrews, since they are known not only as solitary creatures but often as cannibals. The young are born from March to October and number from four to six.

Two closely related and nearly identical shrews are the Maryland shrew, *Sorex longirostris*, and the cinereous shrew, *Sorex cinereus*, also known as the long-tailed shrews. If it were not for certain technical differences and the fact that *longirostris* is smaller and more reddish in color than *cinereus*, it would be next to impossible to distinguish between them. Their taxonomic

status is still controversial, some authorities regarding them only as races of a single species. During certain years, and in certain localities, both of these species are rather common, especially along the coast. These shrews, like their relatives, do not hibernate, and it is astounding to note that such small animals can generate enough body heat to stay alive comfortably in sub-zero weather. They are active both during the day and at night, and are very nervous creatures reacting immediately to stimulation. One authority had a specimen die in his hands from nervous shock. However, they are brave little creatures, and when hungry, do not hesitate to attack larger animals. Deprived of food for even several hours they will die of starvation. Since they are secretive little animals, frequently living in the burrows of mice and moles, they are not often seen and the collector seldom manages more than a glance at them even as they "will-o-the-wisp" about in the grasses of open fields. Tiny mollusks, annelids, insects, and dead mammals are taken as food. Sometimes, when other food is lacking, the

creatures may live on plants. These shrews are of economic importance because they destroy a great many insects. The young, varying in number from four to ten, are born from spring until early fall, in nests composed of leaves and grass. These nests are usually situated in a shallow burrow beneath a stump.



Comparative sizes of Maryland moles and shrews

The Winnemona pigmy shrew, *Microsorex hoyi winnemana*, closely resembles its relative the long-tailed shrew but is smaller in size and has certain technical differences in the tooth arrange-

ment. It is rare in collections and is probably the smallest known mammal in the world. Owing to its apparent rarity, little is known regarding its feeding habits, although they are probably like those of other shrews. The rarity of the pigmy shrew can be realized when we see that, despite the fact that the mammals of the Eastern United States had been well studied by 1910, the pigmy shrew was not discovered by science until that year. The scent glands of this tiny shrew are better developed than those of its larger relatives. *Microsorex* makes tiny burrows under the forest floor or under fallen logs, burrows which could easily be mistaken for the holes of earthworms. These are usually found in dry clearings, the type of habitat preferred by the pigmy shrew. Several litters of incredibly small young, numbering five or six, are produced during the spring and summer months.

THE IDENTIFICATION OF SOME GULL TRACKS

by

HENRI C. SEIBERT*

While studying shorebirds on the south Jersey coast, I became interested in the imprints made by the birds' feet in the sand. After a little practice it was possible to identify sanderling, plover, turnstone, and "peep" tracks without difficulty, although the skill required to separate the semipalmated sandpiper's track from that of the Western sandpiper was never developed. Four species of gull were rather common and the tracks of three of these were measured and drawn. On the basis of size alone it became possible to identify each with considerable success. The shape of the track and its average dimensions is shown in Fig. 1 for the laughing gull (*Larus atricilla*), herring gull (*Larus argentatus*), and the great black-backed gull (*Larus marinus*). Unfortunately a good track of the ring-billed gull (*Larus delawarensis*) was never located but it should be safe to assume that it would fall in between the measurements given for the laughing and herring gulls.

Hickey (1943) does not mention gulls in his discussion of bird tracks, Jaeger (1948) depicts the track of the herring gull. The total length as given is $3\frac{1}{2}$ inches, considerably larger than those I measured for that species, approaching the size of the black-backed gull. Jaeger's plate shows the track to have the impression of the posterior pad of the foot and this is included in the dimension cited. This posterior prolongation was never observed in any of the gull tracks found on the beach although there is the possibility that in soft mud it would show up. It was, however, plainly evident in the common tern's (*Sterna hirundo*) tracks. Jaeger's picture shows the toes symmetrically arranged on either side of the middle toe, whereas characteristically the middle toe is turned at a sharper angle to the outer toe. Toenail marks were not discernible although the pads at the end of the digits were noticeable.

In general proportions, the laughing gull and black-backed gull tracks had more in common with each other than either with the herring gull. The ratio of length to width in the former two is 94.5% and 95.8% compared to only 82% for the herring gull. The ratio of the distance between the first and second toes and between the second and third toes in the laughing gull is 74.4%, in the black-backed, 81%, and in the herring, 90%. Not enough tracks were obtained to determine the reliability of these proportions.

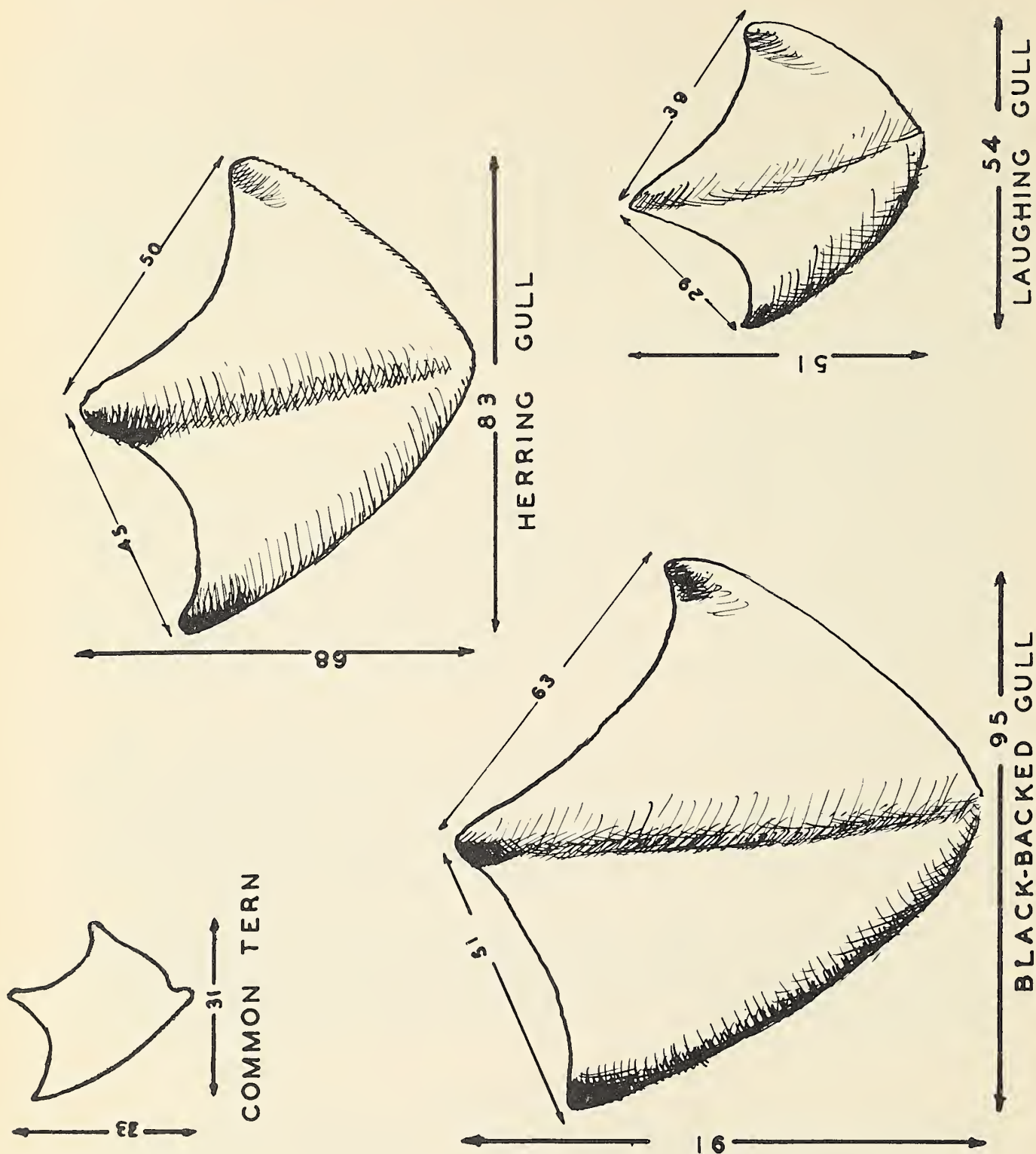
There should be no confusion in the identification of these tracks. The only possibility of mistaken identity would be those of some large tern and until these have been described I am not in a position to ascertain how closely they might resemble gull tracks. Common, black, and least tern tracks are far too small.

Literature Cited

- Hickey, J. J. 1943. *A Guide to Bird Watching*. Oxford University Press, N. Y. xiv + 262, illus.
- Jaeger, E. 1948. *Tracks and Trailcraft*. Macmillan Co., N. Y. vii + 381, illus.

*Contribution No. 47 from the Department of Zoology, Ohio University, Athens, Ohio.

Fig. 1. Gull tracks drawn and measured from imprints left in the sand. Figures represent dimensions in millimeters. Tern track included to show impression of posterior pad.



NEW COUNTY RECORDS FOR THE SLIMY SALAMANDER IN MARYLAND

by
ANTHONY G. MARSIGLIA

Although the herpetofauna of the Baltimore region has been systematically investigated, no actual specimens of the slimy salamander, *Plethodon glutinosus* (Green), from this region are deposited in the collection of the Natural History Society of Maryland.

On April 11, 1948, the writer discovered one specimen at Loch Raven, in upper Baltimore County. This specimen, a young female, was discovered under a large piece of white quartz imbedded about six inches in the ground in a sparse woodland. The area was very moist, the result of a misty drizzle that followed a heavy rainfall. The slope was dotted with skunk cabbage. A thin undergrowth was present and many rotting oak logs were lying on the ground. Physiographically, Baltimore County is located almost entirely in the Piedmont Plateau region. Loch Raven itself is situated about two miles above the Fall Line in a northwesterly direction.

During the course of the last eighteen years the Natural History Society has acquired fifty-eight specimens of *Plethodon glutinosus* from Maryland. Most of these have been found in the mountain region of the State while a few are recorded from the Piedmont Plateau.

The species is represented from the following localities:

Garrett County -

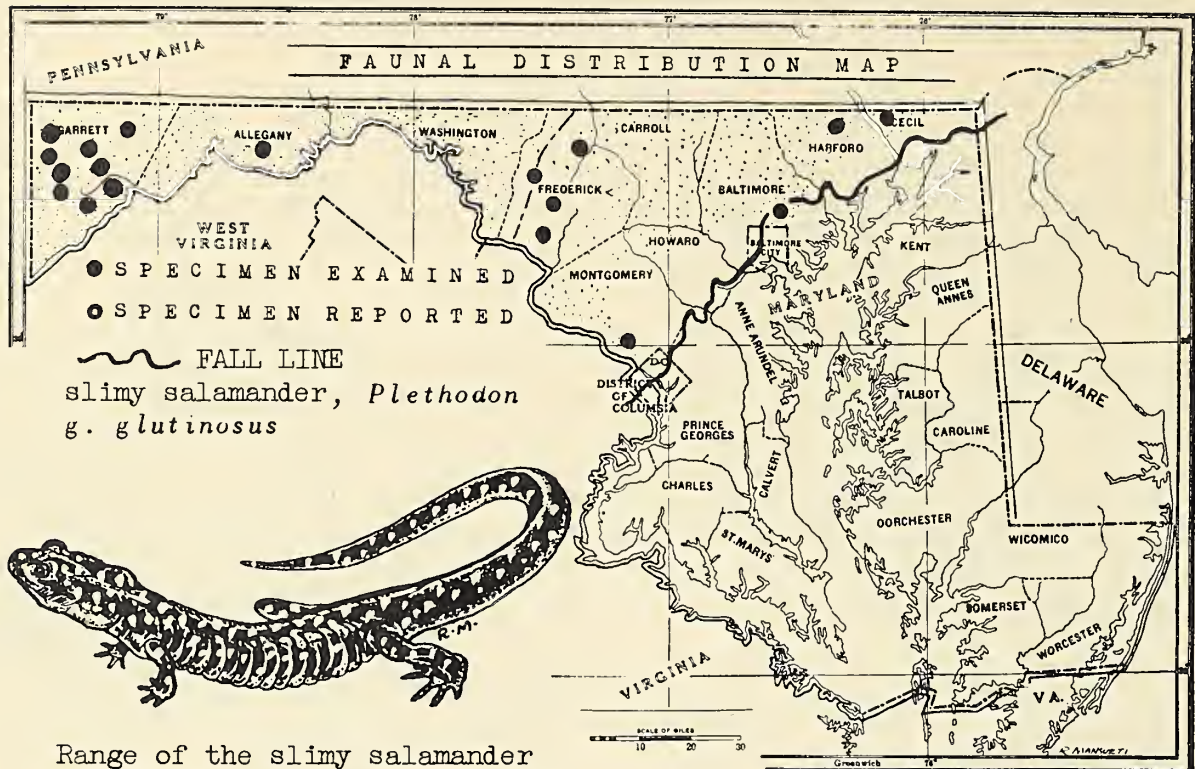
New Germany	1938	one specimen
New Germany	1940	four specimens
New Germany	1947	one specimen
Sang Run	1947	four specimens

Frederick County -

Pen Mar	1947	four specimens
Gambrill State Park	1940	three specimens
Catoctin	1940	seven specimens
Catoctin	1940	four specimens
Thurmont	1946	one specimen
Yellow Springs	1948	ten specimens

Harford County -

Deer Creek	1935	two specimens
Broad Creek	1949	seventeen specimens



Range of the slimy salamander *Plethodon g. glutinosus* (Green), as represented by dots. Shaded area represents the general range of this species in Maryland.

Additional specimens have been recorded by Conant (1945) in the Piedmont Plateau region of Cecil County, on the Eastern Shore. The United States National Museum has a specimen from Glen Echo Heights (USNM-66843), in Montgomery County. Fowler (1943) has also recorded them from this county. Mansueti (1941) cites records of this species from the highlands of the Gunpowder Falls near Harford Road, and in the Patapsco State Park, both in Baltimore County. Since there are no specimens extant, these records must be regarded as hypothetical. Specimens from Allegany County have been recorded by Keller (1945). In addition, the United States National Museum contains specimens from the following localities in Garrett County: Lewis Knob (USNM-101925-9), Whites Knob (USNM-102198-9), Solomon's Ridge (USNM-102116-7), Bear Creek (USNM-102058), Potomac State Park (USNM-102021), Backbone Mt. (USNM-101985-9), Swamp Run near Savage River (USNM-101959-60).

Bishop (1943) designates the range of the slimy salamander on his distributional map to encompass the whole state of Maryland. Actually, the range includes the Piedmont Plateau and the Alleghanian Provinces as set up by McCauley (1945). No specimens have yet been found on the Coastal Plain of Southern Maryland and the Eastern Shore.

Its close relative, the red-backed salamander, *Plethodon cinereus* (Green), is distributed throughout Maryland in almost every variety of terrain. Littleford, Keller, and Phillips (1947) have inferred that the red-backed salamander possesses a peculiar water-controlling mechanism which allows it to withstand a great amount of desiccation. Perhaps the slimy salamander lacks this particular adjustment to a more or less degree, hence its apparent limitation above the Fall Line.

I wish to express my appreciation to Messrs. R. Mansueti, J. E. Cooper, H. C. Eichhorn, Jr., L. Lemay, R. Lambert, and J. Gentile who helped gather much of the actual material and data.

References:

- Bishop, Sherman C.
1943 Handbook of Salamanders. Comstock Publishing Company, Ithaca, N. Y., pp.250-253
- Conant, Roger
1945 An annotated Check List of the Amphibians and Reptiles of the Del-Mar-Va Peninsula. *The Society of Natural History of Delaware*. p. 2
- Littleford, Robert A., William F. Keller, and Norman E. Phillips, Studies on
1947 the Vital Limits of Water Loss in the Plethodont Salamanders. *Ecology*, Vol.28, No. 4
- Mansueti, Romeo
1941 A Descriptive Catalogue of the Amphibians and Reptiles Found in and Around Baltimore City, Maryland, within a Radius of Twenty Miles. *Natural History Society of Maryland. Proc. No. 7*, pp. 14 and 15
- McCauley, Robert H.
1945 The Reptiles of Maryland and the District of Columbia. Pub. by author, Hagerstown, Maryland



NOTES FROM FIELD AND STUDY

TUFTED TITMOUSE AND CRESTED FLYCATCHER EGGS IN THE SAME NEST.

While going the rounds of some nest-boxes erected in the woods of Dorchester County, I observed a nest of the crested flycatcher (*Myiarchus crinitus*) just started in one of them. This was on May 25, 1917 and on June 6th I revisited the box. Imagine my surprise when I saw in the same nest two eggs of the flycatcher and five eggs of the tufted titmouse (*Parus bicolor*).

All of the eggs were quite warm and, although there was no bird upon the nest, the presence of a protesting titmouse in the nearby trees gave sure indications that she was incubating this unique clutch. The nest, as a whole, resembled that of the flycatcher, being composed of hog hair, feathers, snake-sheds and leaves. The lining, however, showed work of the titmouse, probably added as she was laying the eggs. This was mostly of strips of inner tree bark, scales from the belly of snake skins and fine hair - all typical nest material of the titmouse. All of the eggs showed traces of incubation, especially those of the flycatcher, which were most heavily incubated.

Ralph W. Jackson

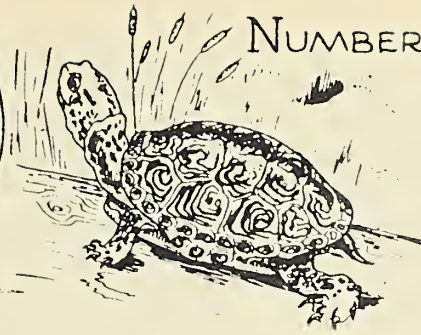
CROWS CATCHING MICE

While hauling long fodder for the shredder one day, we noticed a pair of crows, *Corvus brachyrhynchos* hovering around the loading wagons. These shocks of fodder provide excellent shelter and food for countless numbers of mice and as the stover is shifted to the wagons the unfortunate rodents rush out seeking other cover. This pair of crows seemed to relish the mice as dainty morsels and were catching them with pronounced success. In the pursuit they seemed to be quite oblivious of man's presence, often approaching within thirty or thirty-five feet.

In one particular instance, a mouse ran out in the direction of one of the hovering crows, which immediately followed the fleeing mouse, dropped to the ground, picked it up with its bill and started to fly away with it. However, in securing the mouse the crow seized it too near the tail, which was plainly visible from our close position. At a height of twelve or fifteen feet we could see that an unusual strife was taking place, for at this point the crow released his hold on the mouse, uttering a harsh "caw" in so doing. The bird descended to the ground apparently with the intention of recapturing the mouse, which however, had made good his escape by reaching the cover of some grass.

From the observations of Mr. E. L. Barnett and myself we are of the opinion that the mouse succeeded in twisting so as to bite the crow.

Ralph W. Jackson



NUMBER 10

MARYLAND NATURE LEAFLET

OUR MARYLAND INDIANS

by

EDMUND B. FLADUNG AND RICHARD E. STEARNS

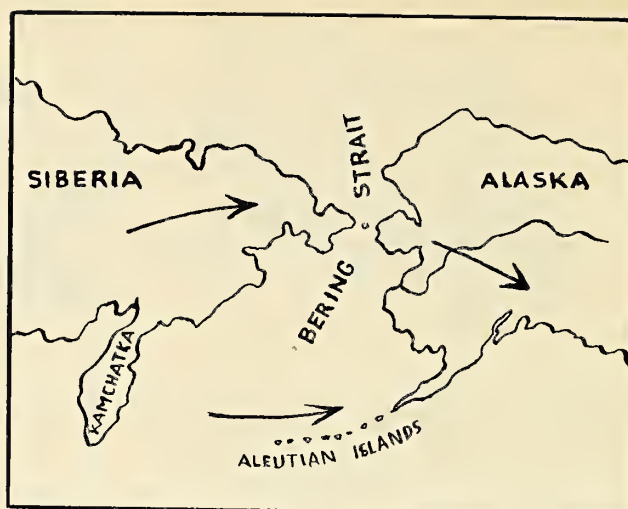


Have you ever found an Indian arrowhead? Have you ever wondered what kind of men first trod the trails which wind along our rivers? Most of us in one way or another have thought about the people who once roamed over our Maryland hills and paddled through our Maryland waters in the days before the first Europeans sailed up the Chesapeake. Where did our Maryland Indians come from? What did they eat? What did they wear? Since these people had no written language and the early explorers wrote only a few descriptions of them we have to depend for our answers to these and many other questions upon the remains of objects which they made and left behind them. Piecing together the information, the archeologist (the scientist who studies such remains) has been able to tell us some of the things we wish to know.

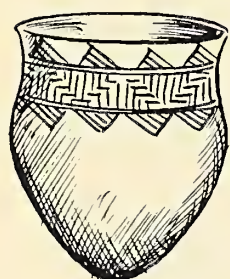
We know, for example, that North America had been joined to Asia at different times in the geologic past. A most striking proof of this is the very close resemblance of certain animals and plants in the two hemispheres. Likewise the so-called American Indians closely

resemble the people living in various parts of northeastern Asia. For instance, in Asia we find people with brown or copper-colored skin, dark eyes and coarse, straight, black hair. These same traits appear in our American Indian, even today.

When the ancestors of the American Indians came to the Western Hemisphere, we cannot say. One thing is certain; they did not arrive until or perhaps even after the Ice Age. They did not come to America all at once in a large body, but on the contrary, their coming was a gradual one, probably taking several thousand years. They spread and multiplied, occupy-



ARROWS INDICATE PROBABLE ROUTES USED BY INDIANS CROSSING TO AMERICA FROM ASIA OVER TWENTY THOUSAND YEARS PAST



CLAY POT



PIPES



CELT



GROOVED AXE



HAFTED ARROWPOINT



BANNERSTONE

ing all of North America and pushing down even to the farthest tip of South America. At each place that they settled a special culture developed, so that years later when the white man arrived from Europe he found many distinct races and cultures.

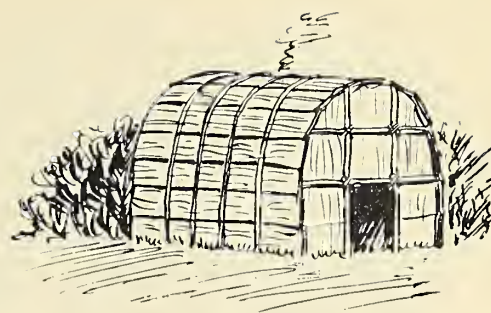
The Indians that once inhabited Maryland were composed of a number of tribes. The most outstanding were known as the Conoy and Nanticokes. These names are to be found on many maps. The Conoys were actually the Piscataways, a tribe whose ruling center was at Piscataway Creek, Charles County. It is known that the king of the Piscataways ruled a large territory along the Potomac. The Nanticokes lived along the Nanticoke River, but later on their name was given to all tribes of the Eastern Shore. On the Western Shore of the bay, in addition to the Piscataways there were the Wicomicos lower down the Potomac and the Patuxents who lived on the Patuxent river.

All these Indians of tidewater Maryland belonged to the great group of Algonquians, which was made up of independent tribes speaking related languages and occupying much of northeastern North America. There seems to have been no permanent settlements to the northwest of the bay in what is now Baltimore, Howard, and Carroll Counties. We knew very little about the Indians of Western Maryland except that at least some were not of Algonquian relationship. (See *The Hughes Site*, Proc. Nat. Hist. Soc. Md., No. 6, 1940).

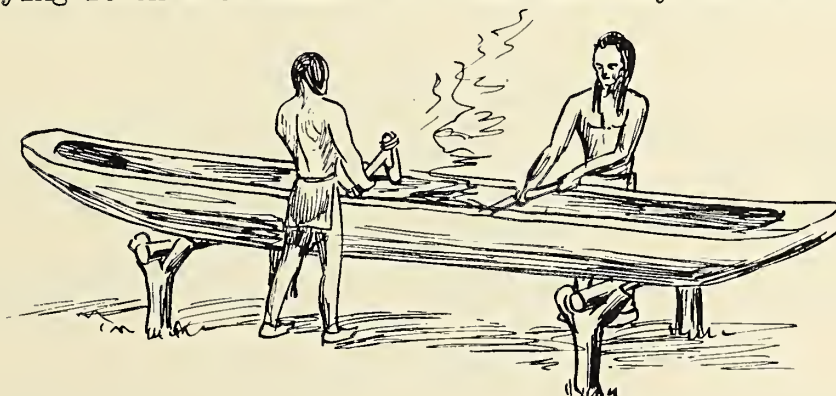
The culture of our Maryland Indians was not as well developed and advanced as that of the Incas or the Aztecs, or even as that of some of the Western Indian tribes, such as the Cliff Dwellers.

The life of our Maryland Indians was a rather simple one. They lived mostly on oysters, crabs, fish, game, berries, and some wild plants. They developed a crude agriculture, growing mostly maize (corn), beans, squash and tobacco. They did not live in tents as some of our Western tribes, but in a sort of hut made of bent saplings forming either a dome or vault-shaped house, covered with matting or bark. Their implements of war, hunting, and other purposes were mostly made of stone. They consisted of arrowheads, spearheads, celts, axes, and gouges. They also made ceremonial and ornamental objects, such as bannerstones and beads. From clay they made pots for holding water and for cooking, and pipes for smoking tobacco. Some of these pots were very artistic, having unique designs and decorations impressed upon them. The arrowhead was fastened to a straight shaft cut from a sapling or a strong reed which was feathered at the end for guidance. The bow and arrow were used in warfare and in hunting mammals and birds for food. The spearhead, like the arrowhead, served the Indian not only for war purposes but also as a tool for catching fish. The axe was used to fell trees to be used for firewood and for building canoes.

The Maryland Indians wore very few clothes, except in winter, when they put on a sort of cloak made of the hides of animals. The women did most of the agricultural work, in addition to cooking, and raising the children. The men were warriors, hunters, fishermen and councilors. Besides very plain cooking the women pounded the maize in a wooden mortar with a pestle of wood or stone (see illustration) and made a sort of cake by mixing the ground meal with water, and baking or frying it on hot stones. This was the only bread known to them.



TYPES OF MARYLAND INDIAN HOUSES



CANOE MAKING

Their only method of transportation was the canoe, which was made out of the trunk of a tree. First a great portion of the tree trunk was burned out. The balance was hollowed out by axe or adze. The only domestic animal of these Indians was the dog, which they probably brought with them from Asia. Their religion was truly a simple one. They worshipped a Supreme Being which they called the Great Spirit. Tobacco was smoked at certain ceremonies.

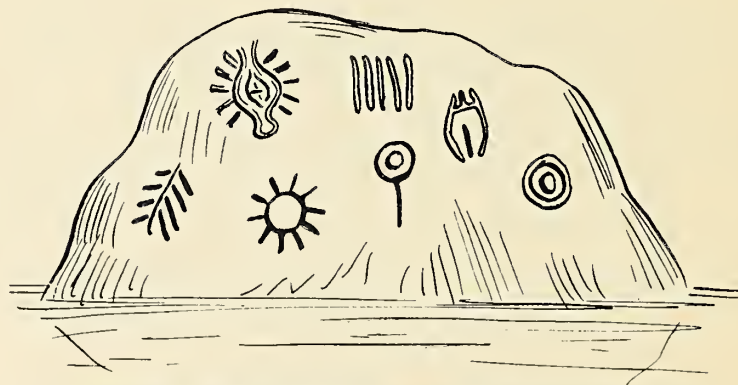
Though these people have disappeared from our State, yet they will be ever remembered by the names they have given to our great Chesapeake Bay, to rivers, streams and some of our counties, such as Chesapeake, Susquehanna, Patapsco, Potomac, Patuxent, Choptank, Monocacy, Nanticoke, Wicomico, Allegany and many others. Some tribes along the Susquehanna River left us picture writing on rocks, called petroglyphs. Most of our knowledge of the early Maryland Indians comes from records of Captain John Smith and Father Andrew White.

References - "Man from the Farthest Past". Carl Bishop, Charles Greely Abbot, and Ales Hrdlicka.

"An Account of the American Indian North of Mexico". Compiled from original sources by Rosa A. Palmer.



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American Toad

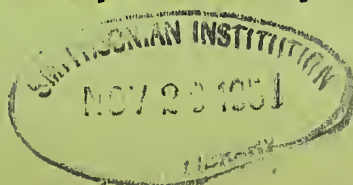
Bufo terrestris
americanus

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MARYLAND NATURALIST

The Natural History Society of Maryland

VOLUME XX



No. 4

1950



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MARYLAND NATURALIST



EDITORIAL

We have recently received the Seventh Annual Report of the Maryland Board of Natural Resources. Covering the fiscal year, July 1, 1949 to June 30, 1950, this report serves to remind us that the existence of the Board of Natural Resources is a fact of considerable importance to readers of the *Maryland Naturalist*. When the State Legislature created the Board in 1941 it gave some substance to a general feeling that the natural resources of the State are a whole. To most persons with interests which have led them to these present pages, this must be more than a feeling; it is axiomatic. For, on whatever level one studies the subject and no matter to what depth one pursues a specialty, it is abundantly evident that all species in our biological resources are part of a "web of life" and, equally, that all life is dependent upon the conditions of its inorganic environment.

There are those who believe that the Legislature of 1941 did not go far enough. The functions of the Board of Natural Resources are merely those of advice and study; it has no authority. Even in the elementary matter of obtaining reports from its constituent agencies, the yearly introductions by Mr. Bayliff show that the Board has difficulty in cajoling compliance to a dead-line. This is, of course, not sufficient evidence that a Board with the authority to direct and to coordinate would necessarily be an improvement. Certainly a close perusal of the 207 pages of this report shows that much useful work is being done now and that there is some degree of cooperation, particularly with respect to the activities of the Department of Research and Education. Perhaps we will gradually evolve toward that unity of direction which is sanctioned by the unity of our resources. In the meantime each Annual Report is a monument to the labors of many individuals in the task of saving, restoring, and using wisely the natural resources of our State. Would that these labors were more widely known.

H.K.



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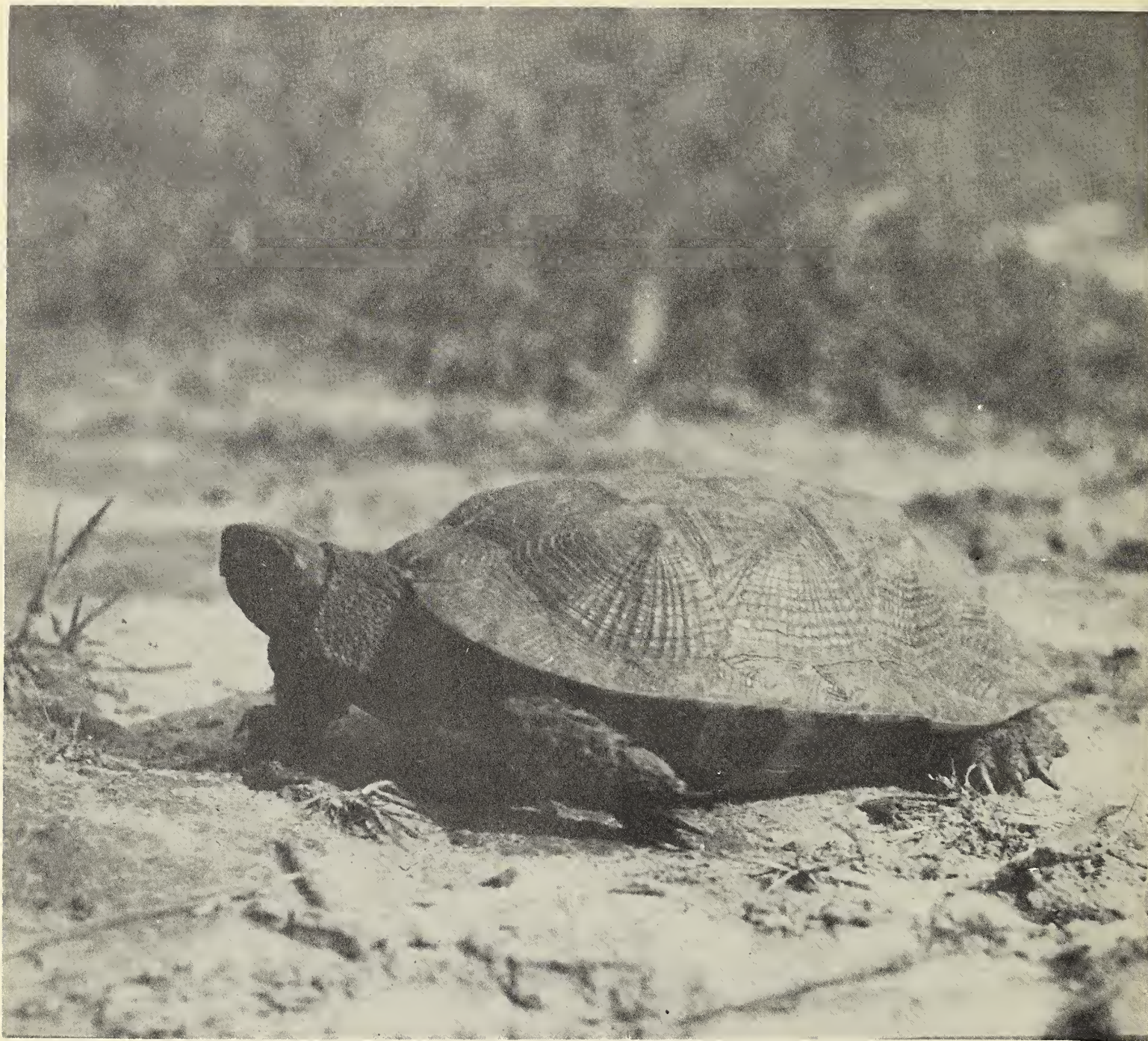
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Wood Turtle - Roberts Island, Md.

Clemmys insculpta

Photographed by August Selckmann

THE SCARLET SNAKE (*Cemophora coccinea*) IN MARYLAND

by

John E. Cooper

During the lengthy span of years from 1862 to 1948, there have been only nine authentic records for the scarlet snake, *Cemophora coccinea* (Blumenbach) from Maryland and the District of Columbia vicinity. Six of these have been considered in previous papers, with Fowler (1945, pp. 89 - 90) presenting a resume of available, authentic records for the species from Baltimore City and Anne Arundel, Prince George's, and Wicomico Counties.

In addition to the other records listed, Fowler (lit. cit.) states, "This snake has also been reported from Severn, Anne Arundel County, and St. Denis, Baltimore County, by Kelly, Davis, and Robertson (1936, p.68)." However, since no specimen exists for either of these locality records, it is the author's opinion that they should be considered invalid. The many diverse forms presented by intergradation of the milksnakes, *Lampropeltis doliata triangulum* and *Lampropeltis d. temporalis*, are sufficiently different from typical individuals to be confused with *Cemophora* and such specimens, as McCauley (1945, pp.101 - 102) suggests, may have been the basis for the two records here considered invalid.

Concerning the specimen collected by Professor Wyatt at Baltimore, lit. cit. no other *Cemophora*, have been recorded from in or around the Baltimore region, and since the character of this region is primarily Piedmont, the snake's further occurrence here seems highly improbable. Probably, the specimen in question was collected in or near the South Baltimore suburbs since this locality is near the Coastal Plain region of the state, where the species would be expected.

Subsequent to the publication of Fowler's article, three additional scarlet snakes have come to light. Of these three specimens, one is from Calvert County and represents a new county record, and the other two are additional records for Anne Arundel County. The Calvert County specimen was discovered dead on the road by the writer on July 7, 1946 at Cove Point. This individual was approximately eighteen inches long and the dorsal blotches numbered nineteen. The general area was Coastal Plain, being a large, sandy beach, with an occasional patch of shrubbery or small grove of pine trees. The area was level and a fairly large pine woods was present about 150 yards from the Chesapeake Bay front. Dwellings were directly adjacent to the spot where the snake was found. In the eastern sector of the beach there was a moderate-sized cattail pond in and around which various species of amphibians were found. Among these were *Rana pipiens*, *Rana clamitans*, *Rana catesbeiana*, and *Hyla c. cinerea* X *evittata* (Dunn, 1937, pp. 9-10). Other species of reptiles and amphibians from the Cove Point area include *Cnemidophorus s. sexlineatus*, *Leiopeltis lateralis*, *Eumeces fasciatus*, *Sceloporus undulatus hyacinthinus*, *Eumeces laticeps*, *Coluber c. constrictor*, *Lampropeltis g. getulus*, *Thamnophis o. ordinatus*, *Haldea v. valeriae*, *Storeria d. dekayi*, *Storeria o. occipitamaculata*, *Carphophis a. amoena*, *Ambystoma opacum*, *Ambystoma maculatum*, *Pseudotriton r. ruber*, and *Microhyla c. carolinensis*.

No food records for *Cemophora* in Maryland are available; but, three kinds

LOCALITY RECORDS FOR CEMOPHORA COCCINEA



of mammals have been found at Cove Point which constitute possible food items. The first, *Cryptotis parva*, is represented by a single specimen found under a board near the lighthouse on the Point. The second species, *Zapus hudsonius*, is recorded also on the basis of one specimen, whereas the third, *Peromyscus leucopus noveboracensis*, is a more abundant species.

Of the two additional specimens from Anne Arundel County, the first, (NHSM-R 715), was found by M. F. Groves and the writer, dead on the road on U. S. route #301 approximately 1/2 mile northeast of Priest's Bridge. This individual was discovered on August 3, 1946. The area was again in the Coastal Plain and the road lay between two woods composed mostly of deciduous trees with numerous intermingled pines. The soil was sandy and the surface was level. Other species recorded from this area were *Carphophis a. amoenus*, *Storeria o. occipitomaculata*, *Cnemidophorus s. sexlineatus*, *Eumeces fasciatus*, *Pseudotriton r. ruber*, *Pseudotriton m. montanus*, *Triturus v. viridescens*, *Bufo woodhousii fowleri*, and *Scaphiopus h. holbrookii*. Also recorded were *Coluber c. constrictor*, *Lampropeltis g. getulus*, and *Natrix s. sipedon*.

The second Anne Arundel County specimen was collected on June 8, 1947, at Mill Creek, near Arnold, by Philip A. Butler. This specimen, for which no collecting data are available, is contained in the collection of the University of Maryland.

The scarlet snake should also be expected in Charles and St. Mary's Counties in Southern Maryland whence have come reports of "coral snakes", and on the Eastern Shore with the exception of northern Cecil County (Piedmont).

The writer wishes to express his appreciation to Mr. James A. Fowler, Director of Education, Academy of Natural Sciences of Philadelphia, for his suggestions and criticisms.

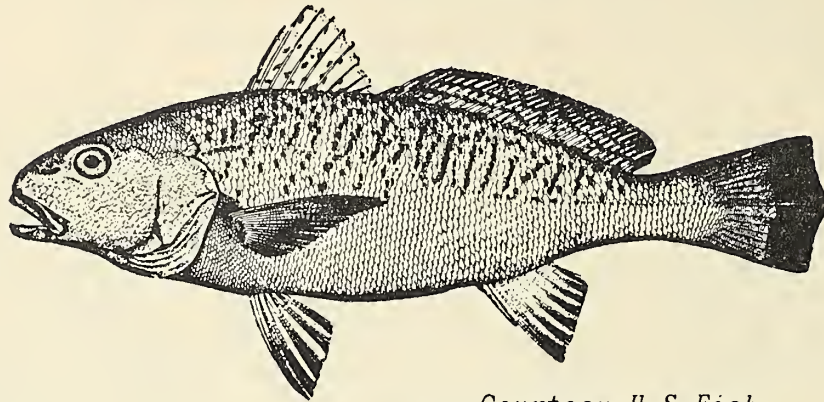
Literature Cited

- Dunn, Emmett Reid
1937 The Status of *Hyla evittata* Miller. Proc. Biol. Soc. Wash.
- Kelly, Howard A., A. W. Davis, and Harry C. Robertson
1936 Snakes of Maryland, Nat. Hist. Soc. Md., Balto., p.68
- Fowler, J. A.
1945 *Cemophora coccinea* (Blumenbach) in Maryland and the District of Columbia Vicinity. Proc. Biol. Soc. Wash. Vol. 58, pp.89-90
- McCauley, R. A. Jr.
1945 Reptiles of Maryland and the District of Columbia, Pub. by author, Hagerstown, Md. pp. 101-102

THE CROAKER, A COMMON MARYLAND FOOD FISH

by

Donald Russel Crawford, Jr.



Croaker

Courtesy U.S. Fish
and Wildlife Service

The croaker, *Micropogon undulatus*, also known as the hardhead, croccus, and king billy is one of the finest and most abundant food fish in the Chesapeake Bay. It has been so plentiful in early spring during certain years that heavy fishing has caused a glut on the market. The fish is generally taken commercially in Chesapeake Bay with pound nets and haul seines. In the Atlantic Ocean off the coast of Maryland, Virginia, and North Carolina where there is an extensive winter fishery for the croaker, it is taken with otter trawls and pound nets. It is also extensively caught by hook and line with peeler crab and shrimp for bait.

The croaker is a migratory fish which enters Chesapeake Bay rather suddenly during early April. The male and female are about equal in number at this time. As the migration progresses the fish ascend the Bay until they reach shallow waters near the shores of the upper parts. Here they feed on crustaceans, annelids, mollusks, sea squirts, and small fish. There is little evidence that the feeding habits of the croaker interfere with other organisms which have a direct commercial value to man.

During the month of July, the male croakers begin to migrate down the Bay and into the ocean. The females begin their journey back to sea a little later.

The fish spawn at sea where the eggs hatch. The period of spawning is evidently from August to December, the month of November being the month of greatest activity. Young croakers, born in the ocean, migrate too and remain in the Bay until adverse conditions cause them to leave. Tiny croakers have been found in the Bay during early fall and throughout the spawning season, and even during early winter.

Post-larval croakers enter the Bay by way of the ocean current which underlies the surface waters of the Bay. The entrance is accomplished at a depth of 24 meters or deeper. This may not be an intentional migration but the result of the young fish being caught in the ocean current.

The croaker of the Atlantic coast matures in three or four years, although some of the males mature at the end of the second year. In the Gulf of Mexico maturity is reached at the end of the second year. The fish there are smaller in size at maturity than those on the Atlantic coast.

It is interesting to note that the croaker in the Gulf of Mexico seldom lives after spawning in its second year. A few do live to spawn again however.

The Atlantic croaker reaches a length of about fifteen inches, while the croaker in the Gulf of Mexico reaches a length of about eight and one-half inches in its second year. As a result of its smaller size the croaker in the Gulf area is inferior as a food fish. No one knows why there is this difference in size. It may be due to a metabolic rate that is too high, a difference in food supply, or other reasons.

The croaker is identified by color, shape, and more properly by various anatomical characteristics which are not difficult to determine. Such features include a rather elongate body, with a long head and rather large mouth, a lower jaw with several barbels, a silvery gray color, back and sides with undulating dark streaks, and dorsal fins with lines of dots.

Adult croakers are among the very few fish that are capable of making a noise. The sound emitted is a croaking one and is made in or out of water. This is done through joint action of a tense air bladder and a rapidly contracting pair of special muscles.

MINERALS FROM THE POWDER MILL DUMPS

by
Jack Kepper

The Powder Mill Shaft is located at the Baltimore City line on Liberty Road. The dump is on the southwest side of the road and extends back in that direction for almost a quarter of a mile. It consists of minerals from the Powder Mill Shaft and from the Old Tower Shaft which is located several miles west of the city line on Liberty Road. These two shafts are part of a series of shafts building the new water tunnel from Baltimore to the Patapsco River.

Powder Mill Shaft was begun in 1947 and finished in the latter part of 1949. The shaft was 180 feet deep and is now sealed up.

The Old Tower Shaft was begun a little over a year after the Powder Mill one. It is still being worked. Due to lack of space the material from this shaft is being dumped at the rear of the Powder Mill material.

The basic rock is a coarse-grained dark green to black gabbro. The rock consists of mostly hornblende with very little plagioclase. Due to the large crystals found in the rock it is evident that the tunnel cut through a pegmatite dike. The rock is pretty much the same for the Old Tower Shaft except for some gneiss which was recently brought up. The gneiss contains no large minerals.

One evidence of a pegmatite dike is the large feldspar crystals from the Powder Mill Shaft. The feldspar is concentrated into two large piles on the

dump. The crystals which are orthoclase are white to tan in color and range from three-quarters to one and a half inches in size. Unfortunately most of the crystals are badly broken or weathered making it hard to distinguish the different crystal forms. I collected one very fine specimen about two inches long which is prismatic in form. I have two specimens of Carlsbad twins, one showing irregular penetration and the other a contact type.

Many massive specimens of feldspar showing good cleavage have been found from both shafts. Some of the massive pieces have the appearance of a fine grained piece of wood. The grainish appearance is caused by stringers of analcite roughly parallel to each other cutting through the feldspar. Large masses of analcite were found in the feldspar pile.

The Old Tower Shaft produced an interesting alteration of picrolite. The mineral is picrolite altered to thomsonite. At first due to its extreme softness I thought it was erionite, a zeolite related to thomsonite, but Mr. James H. Benn of the National Museum on examining it said that it appeared to be picrolite altered to thomsonite. The specimen consists of white radiating fibers on chabazite.

Many fine zeolites, notably analcite, chabazite, stilbite and laumontite have been found here. The analcite crystals range in size from small water clear crystals of an eighth of an inch to large milky white crystals of an inch and a half. Most of the crystals are trapezohedral, but a few appeared to be octahedral cubes. Several water clear chabazite crystals were found in gabbro from the Old Tower Shaft. A few specimens of brown sheaf-like stilbite crystals were observed but the specimens were not good. White laumontite crystals were found occurring in calcite.

Pale green prehnite which is often associated with the zeolites is found with analcite. One small tabular crystal of prehnite was observed.

A rather large vein of chlorite schist containing fine garnets was observed from the Old Tower Shaft. The garnets are deep red to black almandite. The crystals are dodecahedral. Some of the crystals are translucent. Granular brown garnet, probably andradite was also found.

Calcite crystals are found here in many forms. One specimen consists of translucent white, scalenohedral crystals with their faces striated and with a blunt terminal. On this same specimen several pale brown translucent crystals with milky white terminals were observed. A few crystals similar to figure 771 in Dana were found. A group of clear rhombohedral crystals were found in granular calcite.

Wine brown cleavages of calcite are found in cavities of analcite associated with prehnite. Under the Purple X Bulb this calcite fluoresces yellow. The fluorescence is even brighter under the Mercury Vapor Lamp.

Epidote crystals associated with chlorite in analcite are found. The epidote is yellow brown in color and is translucent to opaque. Green chlorite crystals are frequently found with the epidote. Another mineral, zoisite, belonging to the same group, occurs sparingly. The zoisite is gray to brown in

color and is deeply furrowed. It is found in gabbro, sometimes associated with laumontite.

Pyrite, marcasite, and chalcopyrite are all found here in their massive forms. Very few pyrite crystals have been found; the largest crystal I know of is one-half inch and is badly broken. I have one specimen which would be of particular interest to the microhunter. It consists of a group of laumontite crystals which are delicately balancing several small, perfect pyrite cubes on their terminals.

Muscovite and biotite are the two micas found here. The muscovite is silvery white to pale green in color and occasionally is found in its crystal form. Black biotite crystals (figure 989 Dana) are found. Some of the biotite is dark brown by transmitted light.

Several interesting minerals have been found in the serpentine from the Old Tower Shaft. The first of these minerals is large masses some three feet long, of dark green picrolite. Fluffy white masses of asbestos can be seen all through the picrolite. Associated with the picrolite are dark green, short-bladed actinolite crystals. In the bluish green serpentine bronze fibers of bronzite are found.

Graphite was found in chlorite from the Old Tower Shaft. Also some deweylite was found in the serpentine. The deweylite was slightly phosphorescent.

Although rock is no longer being dumped at this site, interesting specimens are still being found. The Powder Mill dumps have partly revived the old mineral days in Maryland.

AN AMPHIPOD NEW TO THE FAUNA OF A MARYLAND CAVE

by Jerry D. Hardy, Jr.

The lack of published information regarding the subterranean crustaceans of Maryland has been pointed out by Davies (1950. *The caves of Maryland*, Md. Dept. of Geology, Mines and Water Resources, Bull. 7:1-70) in his discussion of the biology of Maryland caves. "Most of the arthropods,..., are terrestrial forms that have taken up cavern habitats. Only the cave crickets, cave spiders, and beetles are true cavern forms."

During August, 1950, numerous specimens of a typically subterranean amphipod crustacean, *Synpleonia tenuis* (S. I. Smith) were observed in John Friend's Cave Sang Run, Garrett County, Maryland. Twelve were collected and are now deposited in the collection of the United States National Museum and the private collection of Mr. Leslie Hubricht of Danville, Virginia.

The specimens were collected far back in the cave beyond the twilight zone. They were located by turning over small stones and pebbles in a clear stream which runs through the cave.

Synpleonia tenuis is a small, sightless, shrimp-like creature, grayish-white in color. Some examples are partially translucent and the alimentary

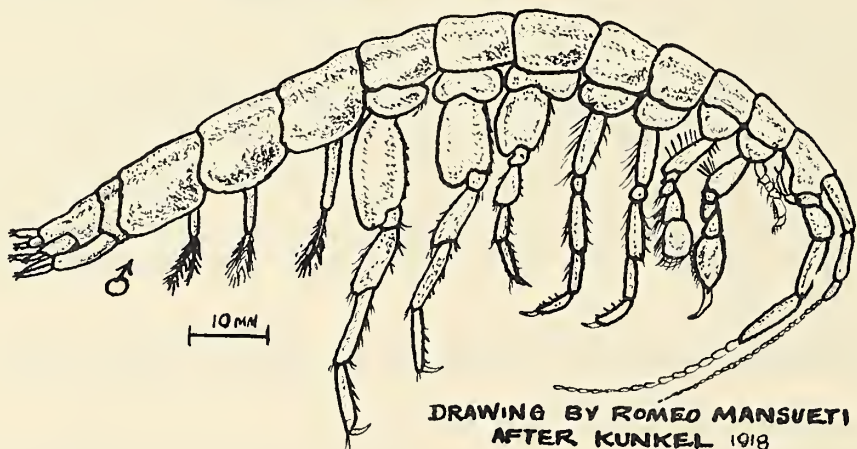
canal is easily distinguishable as a darkened tube running the length of the body. They range from about one-fourth to three-eighths of an inch in length.

Kunkel (1918. *The Arthrostraca of Connecticut*. Conn. State Geol. and Nat. Hist. Surv. Bull. 26:95-98) states that it has been found in wells at Middletown, Connecticut. It has also been collected at Canaan, and under stones in a small brook near New Haven, Connecticut. Leslie Hubricht informs me that it is known from Connecticut, New York, and Pennsylvania. Specimens have been taken in Fayette County, Pennsylvania, very near the Maryland line. The occurrence of *Synpleonia tenuis* in Maryland is not geographically significant; but it is an interesting addition to the cave fauna of the state.

Specimens have been collected at various localities outside of caves in seeps and streams during the early spring. Such examples have been washed out from subterranean habitats. The species is not normally found above ground.

Synpleonia tenuis (S. I. Smith)

AMPHIPODA: Crustacea



SPIDER PORTRAITS



Aranea raji, female

We present on these two pages the portraits of two of the largest and most conspicuous of Maryland's spiders. In comparison with other groups of terrestrial animals spiders have been but little studied. Yet many species are abundant and the naturalist cannot go far in woodland or field without running across these animals or their webs. In Maryland the naturalist is fortunate in having available one of the very few works treating the spider fauna of a limited area: *Common Spiders of Maryland* by Martin H. Muma, published by the Natural History Society of Maryland.

Aranea raji is called the spectacled spider perhaps because of the shape of the markings on the

abdomen. It is a rather large spider, the body ranging from one-half to three-quarters of an inch long, and can be found in all parts of Maryland. The web is a large one and is built on tall bushes or low trees from four to eight feet from the ground. The owner of the web will be found in a retreat formed by a curled-up leaf at one of the upper angles of the web.

Argiope aurantia is even larger, females having a body length of a full inch or more. Curiously, the males of this species are only about one-quarter inch long. The color scheme of the abdominal markings is yellow on black while the cephalothorax is covered with silver hairs. The web is built in weeds and bushes near the ground and often by streams in fields or open woodlands. There is a zigzag portion in the web which gives the maker the common name of writing spider.

Although most spiders possess a venom which is apparently fatal to their small victims, only one Maryland species, the black widow (*Latrodectus mactans*), has any effect on man. From the point of view of an insect spiders must be truly fearsome creatures, but from the human viewpoint it is difficult to see how they can provoke aught save interest.

H.K.



Argiope aurantia, female
Photographs by
J. J. Chisolm, II

NOTES FROM FIELD AND LABORATORY

A RECORD FOR THE EGGS OF CRYPTOBRANCHUS IN MARYLAND

In a previous article on the hellbender, *Cryptobranchus alleganiensis*, published in MARYLAND, Vol. XVII, No. 1, pp. 14-17, 1947, the author indicated the desirability of information concerning the breeding habits of this salamander in Maryland. On September 3, 1949 six eggs of this species were collected in the Castleman River at a point where U. S. #40 crosses the river just east of Grantsville in Garrett County. These eggs, part of a complete strand, were attached together in the rosary-like fashion characteristic of this species. These eggs were found in soft silt on the bottom of a pool along the edge of the river in which spatterdock (*Nymphaea*) was growing. These eggs had evidently been recently deposited inasmuch as little or no development had taken place. No other eggs or adults were observed although efforts were made to locate them.

The date that these eggs were collected falls within the breeding season for the species in western Pennsylvania and New York, as cited by Bishop (1943, Handbook of Salamanders, pp. 62-63); namely, from the third week of August to the first week of September. The eggs found represented only a small fraction of the number normally deposited by a single female which varies from 300 to 450 (Bishop, loc. cit.).

James A. Fowler
Academy of Natural Sciences
Philadelphia, Pa.

FLUORITE FROM THE H. T. CAMPBELL QUARRY NEAR TEXAS, MARYLAND

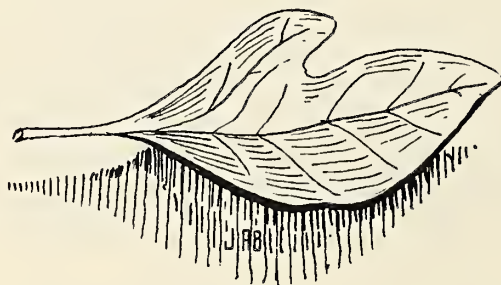
On Sunday, April 10, 1949, the writer found a single crystal of fluorite at the Campbell limestone quarry near Texas, Baltimore County, Maryland. Fluorite is a calcium fluoride, quite commonly found in limestones and dolomites. It is, however, rarely found in Maryland particularly in its crystal form. Previously fluorite had been found at this locality, as a purplish coating on calcite. The crystal, which was associated with pink dolomite crystals, was a perfect cube 1-1/2 mm across and was colorless.

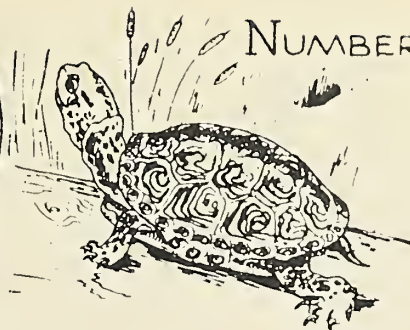
Harold Levey

SEED PRODUCTION OF THE PINK LADY'S SLIPPER

One of the most conspicuous spring flowers of eastern Maryland is the pink lady's slipper or moccasin flower (*Cypripedium acaule*). Although not extremely rare, it is local in its distribution and may be easily extirpated by the thoughtless flower-gatherer. It has often seemed to me that it did not reproduce itself very prolifically and some data recently supplied to me by Mr. Knud Meinhardt confirms this. Mr. Meinhardt found a colony of 24 blooming plants scattered over several acres of woodland near Hamilton in the northeastern section of Baltimore City. Of these, 3 were picked by vandals and 16 failed to produce any seedpods though allowed to grow undisturbed; thus only 5 flowers resulted in seed production. Mr. Meinhardt states: "I did not see any bee or bumblebee enter a flower, although in one instance I found a pink sac torn as though some visitor in panic had forced his way out. I believe the bees in many cases pass up this flower with its complicated way of entry and egress to go to the more inviting pink azalea."

Haven Kolb





NUMBER 11

MARYLAND NATURE LEAFLET

MARYLAND TREE FROGS

by

John E. Cooper



SINGLE VOCAL
SAC OF TREE FROG
WHEN INFLATED



DOUBLE VOCAL
SAC OF TRUE FROG
WHEN INFLATED

With the first rays of spring sunshine and the first humid evening breezes, the cold, dead swamps and marshes of Maryland come to life with those noisy heralds of springtime, the tree frogs. Voices of every type can be heard coming from such areas, many of them beautiful and resonant, several of them harsh and raucous, but all greeting the wonder season in the loudest possible manner. Only the male tree frogs take part in this "spring symphony", inflating their vocal sacs until it seems

they will burst. Unlike their larger relatives, the true frogs, (see Nature Leaflet #4) which have a vocal sac on each shoulder, the tree frogs have but one vocal sac which appears as a throat bubble under the chin. In comparison with the small size of the frog (our largest species seldom exceeds two inches in length) the vocal sac is amazingly large.

Our Maryland tree frogs are divided into two groups - the "true" tree frogs, members of the genus *Hyla*, and the "false" tree frogs, members of the genera *Acris* and *Pseudacris*. The "true" tree frogs have strongly webbed hind feet, and large discs on their fingers and toes which act like suction cups so that these frogs are often found above the ground clinging to weed stalks and bushes. The "false" tree frogs have slightly webbed hind feet and their finger and toe discs are small and poorly developed, so the false tree frogs are seldom found off the ground.

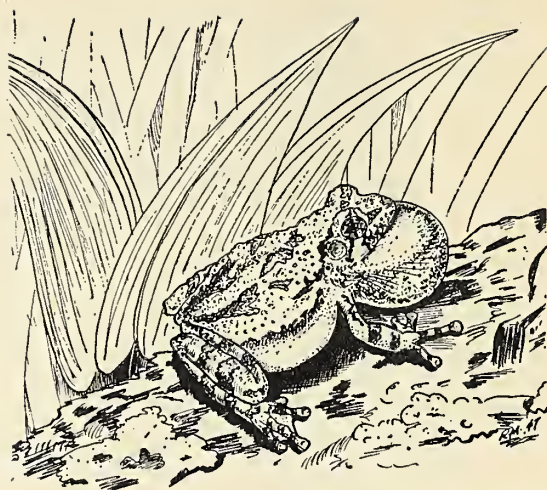


FOOT OF TREE FROG SHOWING ADHESIVE DISKS FOOT OF TRUE FROG; NO DISKS

Illustrations by Romeo Mansueti, those of the green tree frog, gray tree frog, lowland chorus frog, and spring peeper reproduced by courtesy of Nature Magazine.



GREEN TREE FROG



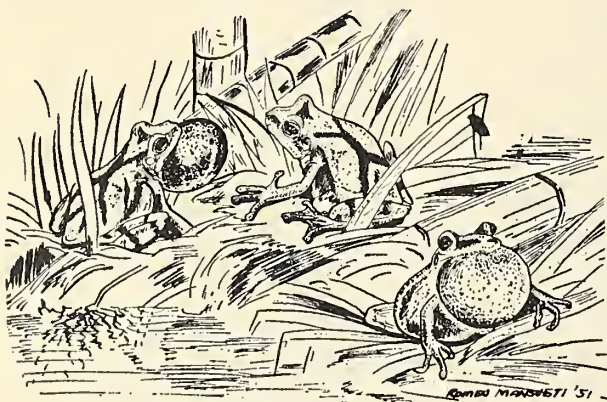
GRAY TREE FROG

Because of this latter fact we say they are more terrestrial than the "true" tree frogs which are said to be arboreal, although actually even such tree frogs as the spring peeper and green tree frog rarely climb trees.

Eight Maryland members of the family called *Hylidae* by the biologists are discussed in this leaflet along with the narrow-mouthed frog which, though not a tree frog, is included to complete the coverage of Maryland frogs and toads in the Nature Leaflet series.

Perhaps the most beautiful of our Maryland hylids is the green tree frog of Southern Maryland and the Eastern Shore. It is about two inches long and varies in coloration from vivid green to nearly black. The common green tree frog (*Hyla cinerea cinerea*) has an unbroken whitish stripe along the side from the corner of the mouth to the hind leg, while Miller's green tree frog (*Hyla cinerea evittata*) found in but a few localities along the Potomac River, has none at all, or only a short one seldom extending backward past the forelimb. Both types have tiny gold spots on the back. A duck-like "quonk, quonk" is the characteristic call of the green tree frog and it is hard to imagine that such a delicate creature could produce this odd sound.

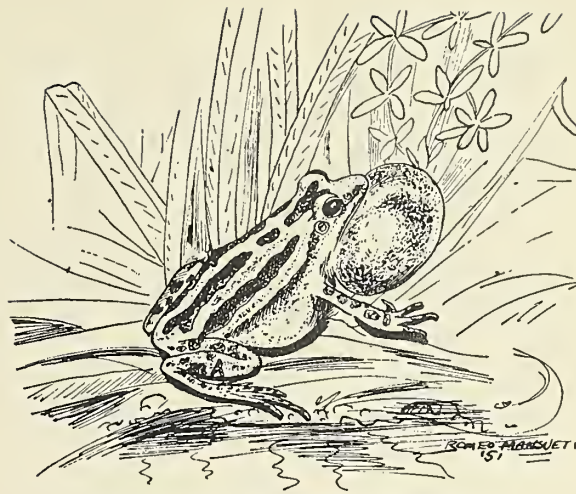
The original weather prophet, according to country people, is a moderate-sized hylid known as the gray tree frog, (*Hyla versi-color versi-color*). This tree-dweller, for it is one of the few tree frogs which actually climb to any extent, is seldom seen on the ground except when egg-laying, and supposedly sings only before bad weather. Its song, a short, harsh trill repeated every few seconds, can be distinguished from that of the American toad by its shortness, since the song of the latter sometimes lasts for as long as twenty seconds. The color pattern of the gray



SPRING PEEPER



PINE WOODS TREE FROG



LOWLAND CHORUS FROG

tree toad ranges from a soft, very light gray, to a beautiful light green, and the undersurface of the hind legs is bright orange. There is a prominent light spot directly below each eye. The tadpole of this species is very attractive with its pink belly, greenish back, and black-spotted red tail fins.

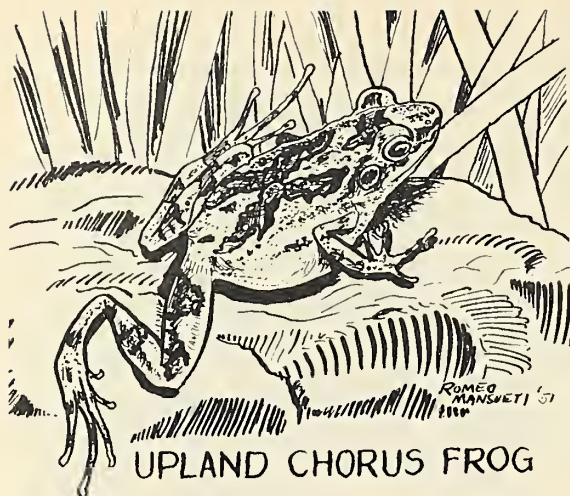
For a creature so small, the light-salmon or tan colored spring peeper (*Hyla crucifer crucifer*) creates a terrific din. Its "shrill, piping whistle" must be familiar to anyone living near a pond or even a large puddle, and it is also heard in many sections of Baltimore City. It is an early singer, often appearing before the ice and snows of winter have disappeared. The scientific name *crucifer* refers to the X or crucifix-shaped marking on the frog's back. The spring peeper shows little fear of intruders into its realm and may easily be collected or observed by flashlight on warm, spring nights. Its inflated vocal sac or "bubble" swells and vibrates, catching the eye. The large toe pads of this species easily catch hold of any surface. Tiny gnats, flies, spiders, worms, and snails are all found on the peeper's menu. During the winter it burrows under moss and leaves to hibernate and has even been found in cavities in the earth.

In central Calvert County, near Battle Creek, is a rather extensive cypress swamp, one of the few areas of its type left in Maryland. This swamp is the only locality in the State, to date, where the pine woods tree frog (*Hyla femoralis*) is known to occur. Although this frog closely resembles the spring peeper outwardly, its pattern is more mottled and not cross-like in appearance and there are small orange or grayish spots on the rear of its thighs.

Calling right along with the peeper in early spring can be heard the lowland chorus frog (*Pseudacris nigrita feriarum*). Its loud "metallic, staccato trill" lasts for about a second. Like other members of its family, the chorus frog is small, seldom more than one and one-quarter inches in



CRICKET FROG



UPLAND CHORUS FROG

give it tremendous leaping power and its warty skin, small toe and finger discs, and the dark triangle between the eyes all aid in identifying it. The females lay about two hundred and fifty single eggs in shallow water, usually attaching them to grass. The cricket frog is abundant throughout Maryland.

The upland chorus frog (*Pseudacris brachyphona*) is found in hilly areas or habitats and, so far as we know, is limited in Maryland to the section of Garrett County known as the Youghiogheny River drainage. It is gray or brown in coloration with a few dark blotches or crescents, and possesses the largest toe pads of the so-called "false" tree frogs. The call of the upland chorus frog resembles that of its relative, the lowland chorus frog, but is faster and higher in pitch. The upland chorus frog breeds from March to July but its eggs are usually deposited in April in ditches and marshes.

Although definitely not a tree frog, the strange little narrow-mouthed frog (*Microhyla carolinensis carolinensis*) adds its voice each year to the chorus of spring serenaders. Like the pine woods tree frog and the upland chorus frog, *Microhyla* has a very limited range in Maryland, being found only around Cove Point in Calvert County. It is a secretive creature and, except when breeding, is seldom found unless we dig it out from rotting logs, from the soil under boards and debris, or from other suitable cover. This frog has tiny, bead-like eyes, a small head and pointed snout, and a fold of skin across the neck just behind the eyes. Its color is usually tan or silvery-gray with faint mottlings on the back and sides. The song of the narrow-mouthed frog closely resembles the bleating of sheep.



NARROW-MOUTH FROG

References; For more information about these animals refer to

1. Conant, Roger - Reptiles and amphibians of the northeastern states - 1947 - Zoological Society of Philadelphia.
2. Dickerson, Mary C. - The frog book - 1914 - Doubleday, Page & Co.
3. "Voices of the night" - An album of phonograph records reproducing the voices of frogs and toads, published by the Comstock Pub. Co.

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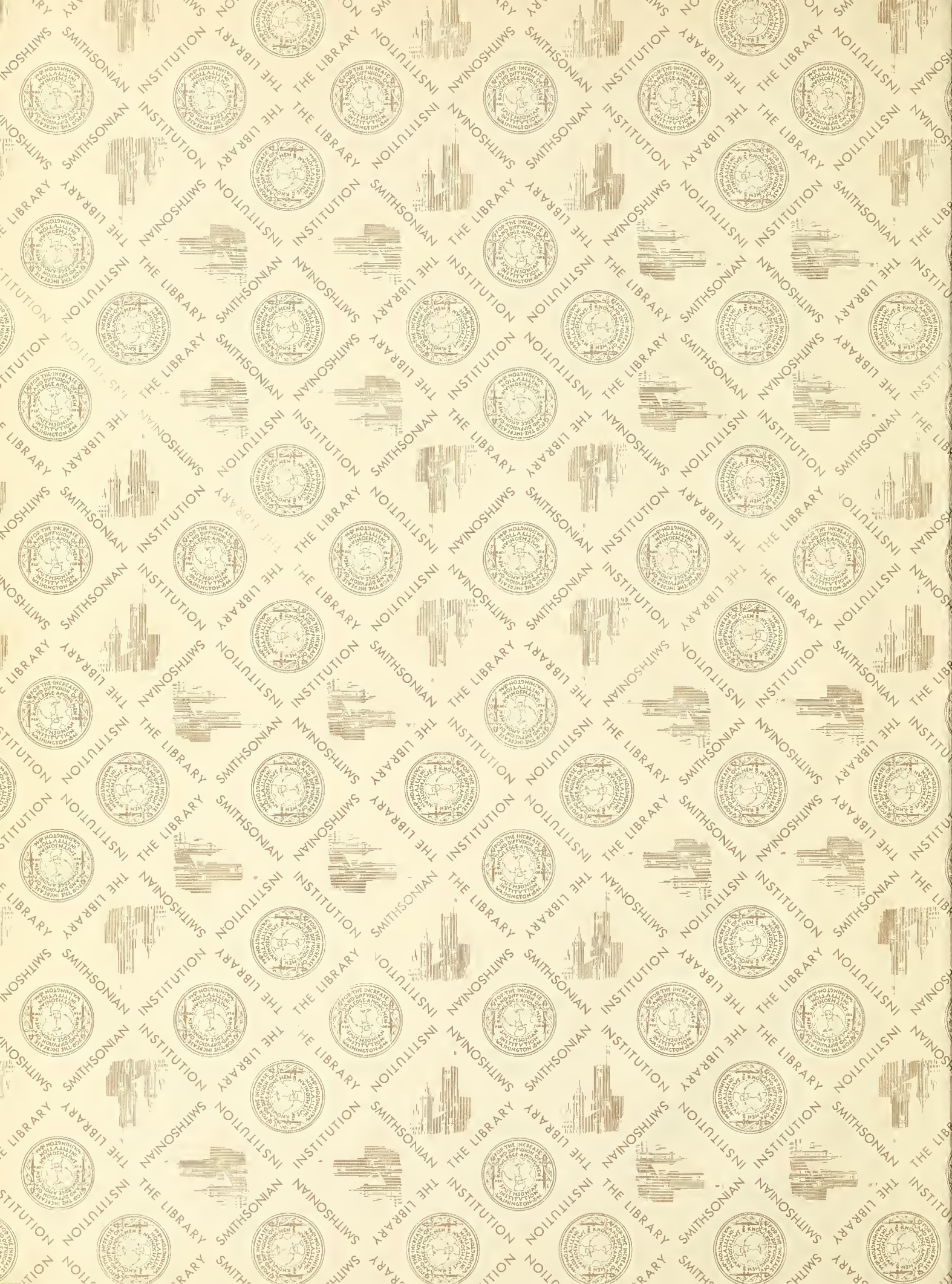
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